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NATURAL RESOURCES

**EX-ANTE POLICY ASSESSMENT FROM
AN INSTITUTIONAL PERSPECTIVE**

A Procedure for Institutional Compatibility
Assessment (PICA)

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JEAN-MARC CALLOIS, OLIVIER AZNAR**

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Ex-ante Policy Assessment from an Institutional Perspective

A Procedure for Institutional Compatibility Assessment (PICA)

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Abstract

Ex-ante impact assessment of agricultural, environmental, and rural policies has become an integral part of political decision making processes in the EU. While there is a large variety of agri-environmental modelling tools available to analyse likely social, economic, and environmental impacts of these policies, scientifically well-founded *ex-ante* policy assessment tools capturing institutional dimensions are still missing. In this paper, we introduce a formalised procedure for modelling – ex-ante – institutional aspects for policy implementation: the ‘Procedure for Institutional Compatibility Assessment’ (PICA). It has recently been developed within the SEAMLESS project as a component of an integrative modelling framework for ex-ante assessment of policy impacts on sustainable development. PICA is based on the assumption that the effectiveness of a policy and the cost-effectiveness of its implementation largely depend on the degree of compatibility between this policy and the institutional context in the respective countries and regions. It has been designed as an explorative and flexible, yet formalised methodology that enables policy makers to identify at an early stage potential institutional incompatibilities. After providing a brief overview of relevant approaches for policy assessment we elaborate on the four distinct steps of PICA and use a core element of the EU Nitrate Directive to illustrate its function.

Keywords: Ex-ante Policy Assessment, Institutional Policy Assessment

JEL Codes: B49, D78, Q18

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1 Introduction

There is an urgent need for scientifically well-founded *ex-ante* policy assessment from an institutional perspective. Ex-ante impact assessments in general have become an integral and systematic part of the political decision making processes at EU level but also at national level in Member States (Bäcklund et al. 2007; EC 2005). Here, the analysis of likely social, economic, and environmental impacts is more and more often to be complemented by an assessment of institutional dimensions (EC 2005). Currently, however, institutional policy analysis focuses mainly on *ex-post* policy impact studies to evaluate past policy performance. While there is a vast amount of institutional ex-post case studies and indicator databanks, institutional economists have not yet developed standardised procedures using this information for making predictions of the institutional feasibility of policies. Similarly, there is a need that such standardised procedures can easily be linked with environmental and agricultural models widely used for policy impact assessment. Both issues point at substantial theoretical and methodological challenges inherent in the analysis of institutions for sustainable resource use. Such critical aspects encompass, for example, the question of how to capture the incentive structure faced by individuals in different decision-making contexts, bounded rational behaviour, informal institutions that form an important part of the institutional environment, and the complexity of transactions related to nature (Hagedorn et al. 2002). Clearly, these problems become even more aggravated in the endeavour of developing tools for a standardised ex-ante institutional analysis of policies.

In this paper, we introduce a formalised procedure for modelling – ex-ante – institutional aspects for policy implementation: the ‘Procedure for Institutional Compatibility Assessment’ (PICA). It has recently been developed in the frame of the SEAMLESS project that is one of the leading research projects in the field of agri-environmental policy impact assessment in Europe (Schleyer et al. 2007a). In this project, an ambitious integrative modelling framework for ex-ante assessment of policy impacts on sustainable development has been created. This so-called ‘SEAMLESS-Integrated Framework’ has been designed not only to assess the policies’ likely impacts on environmental, economic, and social systems, but it also has to provide indications on whether a policy under scrutiny is feasible from an institutional perspective and, thus, can be expected to become effective (van Ittersum et al. 2007). In this

context, PICA has been developed as an explorative and flexible, yet formalised methodology to assess the compatibility between policy options¹ and various institutional contexts.

Following an overview about prominent approaches for policy assessment in Section 2, we outline in Section 3 the basic assumptions leading to the concept of institutional compatibility we use in this paper. In Section 4, we elaborate on all four distinct steps of PICA, while in subsequent Section 5 we focus on PICA Step 1: the classification system to derive distinct policy types. PICA Step 1 is a crucial and the most generic step within the procedure determining the focus of the subsequent steps. In Section 6, different modes of action of the procedure will be illustrated using particular elements of the EU Nitrate Directive as a policy example. In the concluding Section 7, we discuss the importance of PICA as an explorative tool within the policy making process as well as options for methodological improvements.

2 Overview of Approaches for Policy Assessment

Policy analysis guides the process of selecting appropriate policy options to be put into practice. The analysis is commonly subdivided into two categories: ex-ante and ex-post analysis. Ex-post policy analysis is designed to evaluate past policy performance e.g., in terms of effectiveness, transparency, and distributional fairness to reach policy objectives and includes a wide range of methods, such as surveys, case studies, etc. The capability of these approaches, however, is limited since they do not provide for a way for evaluating the effects of policies prior to their implementation. In contrast, experiences with ex-ante evaluations are still rare (Blazek and Vozab 2006; Todd and Wolpin 2006).

In the early phase of the policy life cycle, the Cost of Policy Inaction (COPI) method is often used as an ex-ante evaluation tool. In particular, COPI supports the policy recognition phase of the policy life cycle when the emphasis is on identifying problems, warning, communicating the need for policy action, and sketching the urgency of the policy problem relative to other issues. COPI is used to identify and quantify roughly the environmental damage occurring if no new policy is designed to address the underlying (environmental) problem or if the existing policies are not revised accordingly. COPI is not suitable, however, for comparing and choosing between different policy options, or for judging on the efficiency of policies (Bakkes et al. 2006).

¹ We conceive policy *options* as (sets of) policy *instruments* that a policy maker *intends* to implement to reach a (set of) policy *objectives*; i.e., the policy instruments are not implemented at the time of the assessment.

Methods that support a later phase of the policy life cycle – the selection of policy options – are subsumed under the notion of ‘ex-ante impact assessment’. Here, the Cost-Effectiveness Analysis (CEA) has become a prominent tool for policy makers to determine the least-cost alternative among a set of already available policy options. The systematic assessment and comparison of the relative costs and effects of given policy instruments allow for a prioritisation between options. CEA cannot, however, assess if a respective policy option is economically worthwhile (e.g., Postle et al. 2005; Whitby and Saunders 1996). Other methods that are used in this phase of the policy cycle usually comprise some form of simulation where potential actions are pre-tested in an artificial setting in order to gather information about possible consequences (Becker 2001: 315). There are two main forms of ex-ante impact assessment: a) Environmental Impact Assessment that is applied to assess planned projects, and b) Strategic Environmental Assessment that is used for the ex-ante impact assessment of policies. The various forms of ex-ante - mainly environmental - impact assessments that are conducted are often accompanied by social impact assessment (ibid: 312).

Technology assessments as well as economic and fiscal impact assessments are often combined with social impact assessments, too. In the first step of a social impact assessment, scenarios are designed to sketch out possible future contexts for the actor system and the target system. Thereafter, strategies are designed that might be able to mitigate or even eliminate the problem. Here, various economic models are used in forecasting these strategies, i.e., the effects of a project or policy. For instance, Capello and Spairani (2004) use scenario building methodology to estimate growth and spatial distribution of the Gross Domestic Product in alternative scenarios for communication and infrastructure policies. Another example is provided by Todd and Wolpin (2006) who employ a dynamic behavioural model of schooling and fertility to forecast the effects of a program on school and work choices and on family fertility. In contrast, ex-ante impact assessment incorporating the institutional perspective of policy implementation has hardly been an issue in economic analysis. Further, while political science and sociology sometimes address institutional aspects in ex-ante impact assessments they do not focus on the *effects* institutions have on the (economic) decisions of individuals (e.g., North 1991).

In cases where it is possible to quantify costs *and* benefits in monetary terms, a major tool for ex-ante impact assessment is the Cost-Benefit Analysis (CBA). In contrast to COPI, CBA has a narrower and more concrete focus and tends to work with more specific data. Despite its widespread use, it has many practical and conceptual difficulties associated with monetising costs and, in particular, benefits of a proposed policy. This is particularly true in developing

and transition countries where methods of quantification are generally underdeveloped. Further, those countries are rather unfamiliar with systematic assessments of the benefits and costs of new regulations (Kirkpatrick et al. 2003). Due to the methodological difficulties to monetise costs and benefits, CBA is hardly objective and is slanted in various ideological directions. Thus, the role of CBA within a political context is often that of political argument, not scientific evidence (Bickers and Williams 2001; Kirkpatrick et al. 2003: 15). Other (supporting) valuation methods used for ex-ante policy analysis, such as Contingent Valuation, Travel Cost Method, and Hedonic Pricing try to capture the problem of monetising likely policy impacts. Still, from an institutional perspective, costs and frictions of policy design and implementation are not addressed by these methods; not the least because they are difficult to estimate and quantify ex-ante.

Another way to come to ex-ante predictions of the likely impacts of policies or projects is to implement alternative versions of the policy in an experimental situation and to compare their relative impacts and effects. Despite the fact that such an experimental approach is often too costly and time consuming to be feasible for policy design purposes, in some cases experimental data has been used successfully to validate forecasting model outputs (Todd and Wolpin 2006). A particular form of these experiments is the ‘natural experiment’ (Rosenzweig and Wolpin 2000), a method where treatments are purposively randomised to overcome the problem of self-selection that often leads to misinterpretations.

This brief overview shows that there is a lack of methods and procedures of institutional ex-ante evaluation of policies, let alone, reliable and good indicators. However, effectiveness and cost-effectiveness (including transaction costs for design and implementation) of a particular policy depend, among other things, on the institutional environment and the institutional arrangements in place. There will be high transaction costs of implementation if the institutional context does not ‘fit’. Given the strengths and weaknesses of the different approaches, there is a need to triangulate methods and to complement the tool box for ex-ante policy analysis from an institutional perspective.

3 The Concept of Institutional Compatibility

In this Section, we outline the basic assumptions underlying the concept of institutional compatibility used for the ex-ante institutional policy assessment introduced in this paper. Institutions are defined as the formal and informal rules of a society or of organisations that facilitate co-ordination among people by helping them form expectations. They also function

as constraints that shape human interaction and the enforcement characteristics of these constraints (North 1990: 3). Institutions do also define certain organisations, but these organisations are best thought of as not being institutions, but as being defined by institutions (Bromley 1989: 43).

The institutional policy assessment is based on the assumption that policies will affect certain areas of reality, which are already subject to valid and (more or less) effective institutions. Thus, an adequate and correct understanding of the institutional configuration and of the situational logic of the institutional environment in which a policy is to be implemented is needed as a necessary precondition for assessing the balance between intended and unintended consequences of that policy. (Aligica 2005; Esty et al. 2005: 11; Bicker and Williams 2001: 235). To minimise unexpected and possibly disastrous outcomes, it is important that those who craft and modify rules do understand how particular combinations of rules affect actions and outcomes in a particular ecological and cultural environment (Ostrom 2005: 3). This is particularly important for policy makers at higher administrative levels who often have no direct relation to the problems on the ground. Yet, according to Boettke and Coyne (2005), models of human interaction based on economic theory often have their problems and limitations in real social settings. Similarly, although aware of the oversimplification, most agri-environmental models used for policy assessment assume that with the implementation of a new policy the institutional arrangements conducive for that policy will be perfectly in place, or that a sub-optimal institutional arrangement will change automatically towards 'perfection' at once and with no costs. In addition, it is often assumed that the actors will comply with the policy.

Given the paramount importance of the respective institutional context for policy implementation, the institutional assessment of policy options presented in this paper follows the concept of institutional compatibility. This concept refers to the compatibility between policy instruments and the respective institutional context to assess the effectiveness and cost-effectiveness of policies. More precisely, effectiveness and cost-effectiveness of policies depend on the institutional arrangements (property rights and governance structures²) in place. Thus, on the one hand, appropriate institutions increase the likelihood of actually achieving the policy objectives, i.e., they increase the likelihood of actors' compliance and (intended)

² Governance structures are the organisational solutions for making rules (institutions) effective, i.e., they are necessary for guaranteeing the rights and duties and their use in co-ordinating transactions (e.g., Ostrom 1990).

change of behaviour. On the other hand, appropriate institutions ensure that these policy objectives are achieved at reasonable costs. Policy instruments that have proven to be very cost-effective in one specific institutional context might perform rather poorly in another, i.e., they might not be effective at all, or they might induce higher costs to become effective. For example, a regulatory or command-and-control policy that puts a ceiling on the allowed amount of pesticides used per hectare and year might be ineffective if there is no authority in place to monitor and sanction farmers' non-compliance. Here, effectiveness could be increased by establishing such an institutional mechanism; yet, the costs for establishing it might be substantial, thus, reducing the cost-effectiveness. The justifiable costs to be borne by society to make the policy effective cannot be defined by scientists; they depend upon public opinion and political will. However, the role of scientists can be to identify and to specify those transaction costs in a more transparent manner. This information would enable policy makers to design better policies and to make their choices on a more solid basis.

In particular if agricultural, environmental, and rural policies are concerned, suitable governance structures have to address the specificities of nature-related transactions and the prevailing interdependencies of the actors, i.e., the fact that the choice of one actor may influence the choices other actors make. This problem is often overlooked in conventional economics which assumes that agents are independent (Paavola and Adger 2005) and largely ignores the complexity of nature-related transactions (Hagedorn et al. 2002). Political jurisdictions targeted by a policy have to match, in an appropriate manner, with the range of physical, economic, social and, in particular, institutional linkages found in the rural areas and in the agricultural sector. If carefully designed, governance structures can facilitate communication and co-ordination among diverse networks of stakeholders in EU agricultural, environmental, and rural policy making and beyond, thus, making effective policy implementation more likely.

4 A Procedure for Institutional Compatibility Assessment (PICA)

In the previous section, we argued that ex-ante policy assessment has to be linked to a comprehensive examination of the respective institutional environments in which policies will be implemented, i.e., the institutional contexts in which individuals and groups are seeking to act on their preferences and shared understandings (Bickers and Williams 2001: 234). Hence, the institutional assessment within the SEAMLESS project has been conceptualised to reveal where - i.e., in which country or region - a policy option would be compatible with the

existing institutional structures, and where an institutional misfit that is likely to hamper policy implementation can be expected.

The Procedure for Institutional Compatibility Assessment (PICA) comprises four distinct working steps:

Step 1: The policy options are clustered according to a) type of intervention (regulatory, economic, and advisory), b) area of intervention (hierarchy/ bureaucracy, market, and self-organised network), and c) possibly induced property rights changes. This classification allows identifying the generic structure of a policy option.

Step 2: Each policy type is characterised by a specific set of crucial institutional aspects (CIA)³.

Step 3: Indicators help to evaluate the potential of respective CIA to constrain or foster the implementation of a policy option. The institutional indicators⁴ are selected from existing indicator lists, perhaps modified, or new proxies are elaborated.⁵ Further, concrete assumptions on links and relationships between a CIA and the respective set of indicators are made.

Step 4: The information provided by the institutional indicators is used for a qualitative assessment of each identified CIA. Subsequently, the CIA and the related assessments are arranged in thematic categories of institutional compatibility leading to qualitative statements about the probable effectiveness of a policy option. This allows for drawing conclusions about an institutional fit or misfit between policy options and institutional contexts.

Accordingly, the results of the application of PICA are functioning as an early warning system as it sensitises the policy maker at a very early stage of the policy cycle to potential institutional incompatibilities that may prevent the proposed policies from being actually implemented or that make them less effective. The results of PICA can, thus, also serve as a starting point for a *subsequent* analysis of the causalities of the institutional incompatibilities

³ An initial list of 40 crucial institutional aspects linked to common policy types in agriculture, environment, and rural development has been compiled in the frame of the SEAMLESS project (Schleyer et al. 2007a: 35ff.). In this paper, only selected crucial institutional aspects will be introduced.

⁴ Institutional indicators are here defined as variables and proxies that are used as *input* to the institutional assessment within PICA. They do *not* represent the results and output of the institutional assessment.

⁵ About 100 institutional indicators have been compiled so far in the frame of the SEAMLESS project (Schleyer et al. 2007a: 38ff.).

foreseen and for imploring possibilities to modify policies and/or the respective institutional environments to overcome these incompatibilities.

5 Focussing PICA Step 1: Deriving Policy Types

In this Section, we present the classification system which is used in PICA Step 1 to identify the generic structure of a policy option. The policy types introduced here offer a systematic way to classify policy options linked to agriculture, environment, or rural development that a policy maker might wish to assess. The particular *type of intervention* together with the *area of intervention* provide the basic information to describe a certain policy type. An additional dimension used to classify policy options is *possibly induced property rights changes*. The objective of this specification of policy types is to provide a suitable, yet formalised structure to identify crucial institutional aspects (CIA) that are of *particular* importance for the policy option under scrutiny. It is assumed that the policy type, as represented by distinct boxes in the matrix of Table 1, is decisive for the range and kind of crucial institutional aspects that can be expected to be conducive or detrimental to the implementation of this policy option. Practically, this typology allows limiting the number of CIA that needs to be reviewed when evaluating the policy to be implemented. In the absence of this classification or filter, all identified CIA relevant for agricultural, environmental, and rural development policies would have to be processed every time a policy option is to be assessed. In the following, the dimensions of the classification system will be explained in more detail.

The types of intervention, i.e., the policy instruments are inscribed in the respective rows of the matrix in Table 1. They describe how and by which means the impact of a policy shall be reached:

- Regulatory or command-and-control instruments (compulsory): e.g., laws, regulations, specific protection targets, and designations of areas for protected habitats or species.
- Economic instruments often using financial (dis)incentives: e.g., taxes, subsidies, grants and loans, and tradable pollution permits.
- Advisory/ Voluntary⁶ instruments: e.g., codes of good practice, extension services and other informative measures, and environmental audits.

⁶ Of course, some economic policies, such as agri-environmental schemes, are also voluntary in character since farmers can choose to participate in those schemes, or not. In contrast, in this category, the term 'voluntary' refers to policies that motivate voluntary actions or behavioural changes of actors without direct financial incentives or regulations, i.e., for example, by convincing actors using various kinds of information materials.

Table 1: Policy Type Matrix

		Area of Intervention (Governance Structures)			Property Rights Change	
		Hierarchy/Bureaucracy	Market	Self-organised network	Induced	Not Induced
Type of Intervention	Regulatory	<p>Policies that <i>intervene at</i> hierarchies/bureaucracies <i>using</i> regulatory (command-and-control) instruments;</p> <p><u>Example</u>: Establishing the European Food Safety Authority and Nature Reserves</p>	<p>Policies that <i>intervene at</i> markets <i>using</i> regulatory (command-and-control) instruments;</p> <p><u>Example</u>: Restrictions on nitrate use</p>	<p>Policies that <i>intervene at</i> self-organised networks <i>using</i> regulatory (command-and-control) instruments;</p> <p><u>Example</u>: Implementing new European statutes for cooperatives</p>	<p>Policies that <i>induce</i> changes in property rights for farmers regarding the natural resources they need for production <i>using</i> regulatory instruments</p>	<p>Policies that <i>do not induce</i> such changes</p>
	Economic	<p>Policies that <i>intervene at</i> hierarchies/bureaucracies <i>using</i> economic instruments;</p> <p><u>Example</u>: Budget cuts for (regional) administrative bodies</p>	<p>Policies that <i>intervene at</i> markets <i>using</i> economic instruments;</p> <p><u>Example</u>: Subsidising organic milk and non-till farming practices</p>	<p>Policies that <i>intervene at</i> self-organised networks <i>using</i> economic instruments;</p> <p><u>Example</u>: Providing funds for LEADER-Local Action Groups</p>	<p>Policies that <i>induce</i> changes in property rights for farmers regarding the natural resources they need for production <i>using</i> economic instruments</p>	<p>Policies that <i>do not induce</i> such changes</p>
	Advisory/ Voluntary	<p>Policies that <i>intervene at</i> hierarchies/bureaucracies <i>using</i> advisory/voluntary instruments</p> <p><u>Example</u>: Providing training material on efficient management structures and administrative procedures (Best Practice)</p>	<p>Policies that <i>intervene at</i> markets <i>using</i> advisory/voluntary instruments;</p> <p><u>Example</u>: Providing information brochures on health and organic food to consumers; providing training on environmental friendly farming</p>	<p>Policies that <i>intervene at</i> self-organised networks <i>using</i> advisory/voluntary instruments</p> <p><u>Example</u>: Providing information brochures with Best Practice-examples; facilitating knowledge transfer between networks</p>	<p>Policies that <i>induce</i> changes in property rights for farmers regarding the natural resources they need for production <i>using</i> advisory/voluntary instruments</p>	<p>Policies that <i>do not induce</i> such changes</p>

Source: Compiled by the authors.

This classification is based on the work of Stone (2002) who distinguishes between five general mechanisms for changing or coordinating behaviour of actors. These are 1) 'inducements', i.e., changing people's behaviour with, often financial, rewards and punishments, here named economic instruments, 2) 'rules', i.e., commands to act or not in certain ways, or determining permissions and entitlements, 3) 'rights', i.e., strategies that allow individuals, groups or organisations to invoke government power on their behalf, 4) 'powers', i.e., shifting the power of decision making to different people, the last three are here subsumed under regulatory instruments, and, 5) 'facts', i.e., strategies that rely principally on persuasion, here named advisory/ voluntary instruments. Stone (2002) also stresses that these instruments are ideal types and that no policy option ever relies purely on one type of instrument. A similar distinction is made by Moskowitz (1978: 65ff.) who analyses a wide range of alternative policy options that have the common objective to redirect financial investments from the private sector to ensure neighbourhood preservation. Here, Moskowitz distinguishes between three types of interventions: a) regulatory policies for mandatory investments, b) direct subsidies, such as tax benefits to change the final profit estimation, and c) persuasion by providing facts, figures, and experience to demonstrate that the private sector could realistically expect profits from these investments. This also corresponds with similar distinctions made by environmental economists (e.g., Stavins 2004).

The *area of intervention* points to the *governance structures* a policy is supposed to have an impact on. More precisely, a policy aims at influencing real-world transactions (e.g., use of pesticides, protection of species, etc.) by changing existing or creating new governance structures that co-ordinate these transactions in such a way that, e.g., their results are internalised by the actors. The differentiation used in PICA follows to a large extent the widely used categories of governance structures (hierarchies, markets, and hybrids) suggested by Williamson (2004). However, first, it can be assumed that almost every governance structure in the real world can indeed be seen as some hybrid form between the polar cases market and hierarchy.⁷ Thus, in the respective columns of Table 1 those areas of intervention that are *closer* to either market *or* hierarchy are subsumed. Second, with specifying the third column *self-organised network*, the attention is directed to a specific (hybrid) form of

⁷ While in *markets* (repeated) economic exchange is based on voluntary bilateral agreements between individuals (e.g., auctions, stock markets, etc.), an authority on a higher level compulsorily selects economic action in *hierarchies* (e.g., state agencies, but also within private firms).

governance structures that is of particular interest if pursuing agricultural, environmental, and rural development policy objectives (Hagedorn 2002).

The column *property rights change* is the third dimension to describe a policy type. It accounts for changes in private and collective property rights likely to be induced by the policy option, in particular, on natural resources. It covers an important institutional specificity of environmental policies. Undoubtedly, most policy options will imply some changes in property rights. However, here it is defined in a more narrow sense pointing to changes in the property rights of farmers on natural resources needed for production, such as land and water. For example, most environmental policies, such as the EU Flora-Fauna-Habitat Directive or the EU Nitrate Directive, reduce directly farmers' property rights. Restrictions on land use, like the prohibition to spread manure on the field during winter months, have direct impacts on the individual production decisions of farmers. Thus, these environmental policies, according to the matrix, would address the governance structure 'market' as 'area of intervention' since restrictions in land use or farming practices are likely to affect the production function of the farmer resulting in higher production costs and, hence, less profit. Yet, these restrictions are also resulting in severe changes in and constraints on (private) property rights of farmers with respect to the (natural) production factor land. In contrast, policies demanding specific health and quality standards of a farmer's produce to be kept when entering the market would also affect his production function; yet, no direct changes in property rights would be involved.

To sum up, the three dimensions necessary to describe a policy type comprehensively are illustrated as a three-dimensional graphic in Figure 1. The x-axis describes the area of intervention, the y-axis the type of intervention, and the z-axis the dimension of property rights change. Each cuboid in the space represents a certain policy type. For illustration, the establishment of the European Food Safety Authority, a policy that intervenes at hierarchies using regulatory instruments and not directly influencing farmers' property rights, can be assigned to the policy type of the dark grey cuboid.

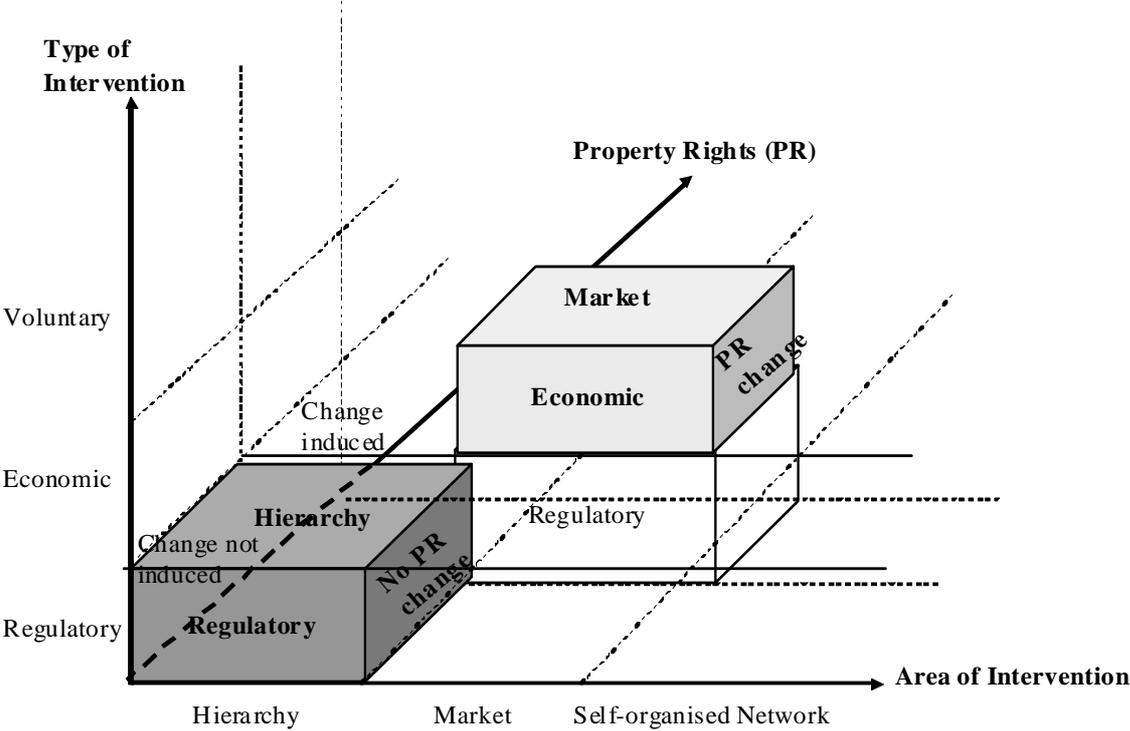


Figure 1: Three Dimensions of a Policy Type

Source: Compiled by the authors.

6 Institutional Compatibility of the EU Nitrate Directive

The EU Nitrate Directive (Council Directive 91/676/EEC) (EC 1991) that was adopted in 1991 policy can be seen as a prominent and typical example of an EU environmental policy addressing water pollution. We take one of the core elements of this Directive as an example to illustrate PICA: when implementing the EU Nitrate Directive Member States have to draw up and implement action programmes in vulnerable zones designated before that shall consist of mandatory rules. These rules determine, e.g., periods when the application of certain types of fertiliser is prohibited, and limitations of the application rates of fertilisers taking into account the characteristics of the zones concerned, in particular soil conditions, soil type, slope, land use, and agricultural practices (see Annex III of the Directive). Furthermore, Member States have to establish suitable monitoring and enforcement systems to ensure actors' compliance with the rules.

Being aware that the Nitrate Directive comprises more and different policy elements that can be combined in diversified ways, to illustrate PICA we only refer to the uncompensated and mandatory production restrictions in previously defined vulnerable zones. We focus on this element of the EU Nitrate Directive and treat it as a single policy instrument and, therewith, abstract from distorting effects due to the other - certainly interdependent - policy elements that would also be implemented when the Directive were to be introduced.

6.1 PICA Step 1: Classification of the Policy Option

Using all available information on the concrete form and content of the policy option provided by the policy maker the PICA expert team⁸ categorises this element of the EU Nitrate Directive – according to the matrix of policy types (see Table 1) – as a *regulatory type* of policy having effects *on markets*. As described above, it demands from the Member States that action programmes are to be implemented that shall consist, among other things, of clearly defined mandatory measures determined in Annex III. Effectively, only the national regulations determine the precise limits of restrictions in time and space. Further, it is assumed that no compensations are paid covering the costs induced by these restrictions.⁹ These uncompensated restrictions have an impact on the production costs of farmers (e.g., because yields decrease due to restrictions in fertiliser use) and, thus, on their position at the market. More precisely, farmers might be forced to offer their products at a higher price resulting in a decrease in demand for those products or they might keep the price and accept reduced profits. The respective impact levels of the restrictions on the production costs of farmers, however, depend on a variety of factors, such as farming practices before implementation of the restrictions, size and type of the agricultural enterprise, soil fertility, and share of land farmed by the agricultural firm that is affected by the restrictions. Clearly, in some cases the restrictions may not impose any further costs, e.g., because fertilisers have not been used in the agricultural firm anyway.

⁸ The PICA expert team is part of the SEAMLESS expert team that is carrying out the policy assessment - on behalf of the policy maker - using the 'SEAMLESS Integrated Framework' after the research project is finished.

⁹ However, national laws to implement the EU Nitrate Directive may be complemented with various forms of compensation schemes that ease the burden for some stakeholders in general, or in selected areas.

6.2 PICA Step 2: Crucial Institutional Aspects Related to the Policy Option

According to the identification of the policy type in the previous step, in PICA Step 2, only those CIA related to regulatory policy instruments intervening in markets have to be considered. Within the SEAMLESS project, an extensive literature review has been carried out to identify CIA that are typically linked with respective policy types (see Schleyer et al. 2007a: appendix 2). Based on this compiled ‘library of crucial institutional aspects’, those CIA are extracted that potentially hamper or foster the effective implementation of policies of the type ‘regulatory on market’, thus, accruing also to the selected core element of the EU Nitrate Directive, in particular, to the implementation of restrictions in fertiliser use. During the application of PICA, relevant national and regional stakeholders and scientific experts are consulted by the PICA expert team discussing the relevance of every identified CIA for the policy option under scrutiny. Here, some of the CIA extracted from the initial literature review might be regarded as relevant for a policy type in general, but not be considered as crucial for the specific policy option to be assessed. Thus, the PICA expert team can decide to skip some CIA at this stage. In turn, additional CIA that have not yet been covered by the literature reviewed may be included in the assessment of the policy option under scrutiny and may also be added to the library of crucial institutional aspects. As a result of the consultation process, the following CIA likely to constrain the implementation of the EU Nitrate Directive were suggested and are presented here for illustrative purposes:¹⁰

- **Strong bargaining power of farmers’ associations**

Implementation of mandatory measures restricting the use of fertilisers in designated vulnerable zones affects directly the production costs of farmers in these zones, often leading to income losses. Yet, the (degree of the) concrete restrictions is determined by the respective Member States or regions. Here, it is assumed that a strong agricultural lobby might be able to weaken these mandatory restrictions, or to obtain exception clauses. Thus, *strong farmers’ associations* might hamper the effective implementation of the EU Nitrate Directive.

- **Information asymmetry state vs. firm and high level of opportunism**

¹⁰ We do not claim that the CIA presented here are indeed the most relevant crucial institutional aspects related to the selected core element of the EU Nitrate Directive. Yet, we deem them to be reasonably relevant and sufficiently plausible since they are based on the extensive literature review mentioned above and on discussions within the PICA group within the SEAMLESS project.

Information asymmetries between public administrations (state) and agricultural producers can be conceived as the result of problems on part of the state to control and monitor the activities of firms. These problems depend, among other things, on the ability (technical/knowledge/human resources) or even willingness of the administration in charge to monitor and, if applicable, sanction actors' behaviour, but also on the characteristics of the resources (and the related activities to be monitored) concerned. Mandatory measures to reduce water pollution by nitrates are difficult – or very costly – to observe and to measure, e.g., the exact amount of nitrates applied per hectare. Thus, farmers' non-compliance with prescribed restrictions is not easy to detect and/or non-compliance cannot be associated clearly with single farmers since nitrates diffuse slowly into often large groundwater basins. Furthermore, it is assumed that *high levels of opportunism* on part of the farmers concerned are likely to exacerbate the problem leading to high costs for controlling necessary to deter actors from cheating.

6.3 PICA Step 3: Linking Crucial Institutional Aspects to Institutional Indicators

As a result of PICA Step 2, the PICA expert team suggests a restricted list of CIA that is considered to be of particular importance for assessing the effectiveness and cost-effectiveness of implementing the selected core element of the EU Nitrate Directive. Those CIA that are selected from the library of CIA are linked with at least one institutional indicator from the available portfolio (see Footnote 5) that can help to evaluate the respective CIA, eventually leading to statements about the effectiveness of policy implementation in PICA Step 4. For further processing, only those indicators are selected that are considered to have some explanatory power with respect to the policy option under scrutiny. At this stage, the PICA expert team has to interact with other members of the SEAMLESS expert team, in particular with modelling and data base experts. Here, the availability, quality, and geographical scope of quantitative data need to be discussed. Further, the precise forms and scopes of suggested qualitative assessments need to be decided on.

For illustration, Tables 2 - 4 contain examples of institutional indicators that might be used for assessing the extent of the selected CIA.

Table 2: Institutional Indicators for Assessing the CIA ‘Bargaining power of farmers’ associations’

Institutional Indicator	Description / Data	Data Sources / Databases	Expert assumptions on links between indicator and CIA¹¹
Memberships in farmers’ associations	Number of farmers that are member in a farmers’ association / Number of farms*100	National Statistical Databases; Assessment by expert group	High percentages indicate a strong bargaining power of farmers’ associations
Fragmentation of farmers’ associations	Number of farmers’ associations	National Statistical Databases	High numbers indicate a relatively weak (total) bargaining power of farmers’ associations
Proximity between farmers’ associations and EU authorities	(Number of) farmers’ associations (of a country) with official representatives in Brussels	Data assembled by expert group	A high number indicates a high influence on the political decision making process at EU level and strong bargaining power
Structure of farming system	Ratio = Number of farms / Number of people employed in the farming sector	SEAMLESS Databases	A low ratio indicates a farming system dominated by large farms (latifundium system) and, thus, a high influence on the political decision making process at national level
Producer Support Estimate	Monetary budget of producer support (e.g., market price support, payments based on overall farming income, etc.) in a country	OECD	High estimates indicate a strong bargaining power of farmers’ associations

Source: Compiled by the authors.

¹¹ Please note that this column will contain *specific* assumptions on links between indicator, CIA, and policy option when actually running PICA. It will be filled by the PICA expert team after discussing the relevance and sufficiency of available indicators for evaluating the identified CIA with respect to the concrete policy option. This process is also likely to produce a restricted (smaller) list of those institutional indicators related to a respective CIA that can be linked meaningfully with the policy option under scrutiny.

Table 3: Institutional Indicators for Assessing the CIA ‘Information asymmetry state vs. firm’

Information asymmetry	<u>Methodology</u> to identify information asymmetry: 1.) Identify potential sources of information asymmetry related to the policy under scrutiny; 2.) Evaluate the impact of this information asymmetry on the efficiency of this policy; 3.) Assess the additional controlling and monitoring costs necessary to reduce the level of information asymmetry to an ‘acceptable’ level	Qualitative assessment by expert group	High additional controlling and monitoring costs necessary to reach an ‘acceptable’ level of information asymmetry indicate a high constraint
Affinity of governments towards devolution	Degree of affinity of the government of a country towards devolution	Qualitative assessment by expert group	Low degrees indicate high information asymmetries since centralised control and monitoring is more costly
Farm density	Average number of farms per 100 ha	SEAMLESS Databases	High numbers indicate higher controlling and monitoring cost, thus, likely higher information asymmetries
Rule of Law	Composite indicator of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Low measures indicate an ineffective/inefficient existing controlling and monitoring system causing information asymmetries

Source: Compiled by the authors.

Table 4: Institutional Indicators for Assessing the CIA ‘High level of opportunism’

Infringement cases	Number of infringement cases in a country brought before the Court of Justice	National Statistical Databases	High numbers of infringement cases indicate high levels of opportunism
Rule of Law	Composite indicator of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Low measures indicate high levels of opportunism
Order	Assessment of popular observance of the law (Part of composite indicator ‘Rule of Law’)	World Bank	Low measures indicate high levels of opportunism

Source: Compiled by the authors.

6.4 PICA Step 4: Aggregating Information on the Selected Crucial Institutional Aspects

In this final step of PICA, the expert team that runs PICA with the help of external scientific experts and stakeholders is using the information provided by the institutional indicators for a qualitative assessment of the restricted list of CIA. This includes, first, combining the various

indicator information available for every single CIA of the restricted list to arrive at a qualitative statement about the relative extent of this CIA in all countries and/or regions. For example, the level of corruption can be determined for every country where the policy option is to be implemented, thus, providing insights in the relative - country-wise - likelihoods for ineffective policy implementation. Second, the PICA expert team is defining thematic categories of institutional compatibility to group the CIA and the respective qualitative statements. While it is certainly helpful to use science-driven categories, such as property rights compatibility, embeddedness compatibility, etc., policy makers who commissioned the assessment might prefer different or additional categories. Each thematic category draws on information from at least one CIA. For the selected core element of the EU Nitrate Directive the PICA expert team suggests to group the information according to the following two thematic categories:

1) *Communication capacity*

- Bargaining power of farmers' associations

2) *Governance structures compatibility*

- Information asymmetry state vs. firm (including high levels of opportunism)

Finally, these categorised region- or country-wise qualitative statements on the compatibility of the policy option will be presented to the policy maker who has commissioned the policy assessment with the 'SEAMLESS Integrated Framework'. Here, an interactive form of communication is preferred since this provides the opportunity to discuss the results and, perhaps, the introduction of complementary policy instruments in countries or regions where – according to the PICA results – implementation is likely to be substantially hampered. Figure 2 summarises the four steps of PICA.

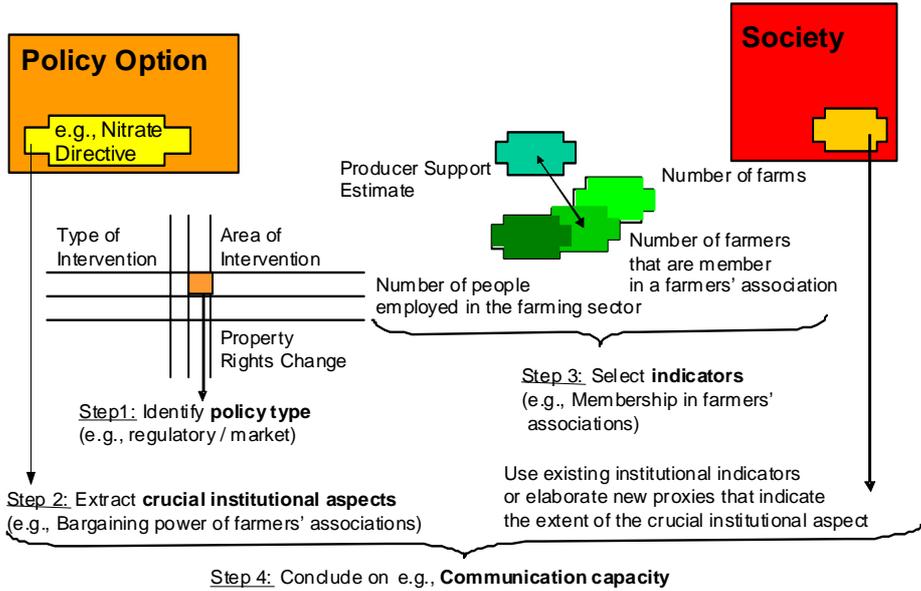


Figure 2: Scheme of the Procedure for Institutional Compatibility Assessment

Source: Compiled by the authors.

7 Conclusion

The methodological and theoretical conceptualisation of PICA is a novel approach that takes the perspective of a policy maker who intends to influence the behaviour of actors when designing and implementing new policies. Unlike perhaps a scientist, he/she may in the first place not be interested in a detailed analysis of the institutional dynamics on the ground. Instead, he/she rather wants to know if a potential policy is likely to change actors' behaviour in such a way that the policy objectives can be reached. Consequently, PICA has been designed as an *explorative* tool that is able to identify main institutional incompatibilities that might act against policy implementation. Thus, PICA can be considered as an early warning system for institutional incompatibilities. PICA results point to (potential) institutional incompatibilities, however, without providing detailed insights in the concrete (region and policy dependent) *causalities* that lead to these institutional compatibilities; thus, further empirical analysis would be necessary to design specific and optimal instruments to overcome

or mitigate those incompatibilities. Here, the overall importance of PICA within the policy making process reaches well beyond exploring institutional incompatibilities since the PICA results allow for a very much focussed design of such a subsequent institutional *analysis*. All in all, PICA may help to avoid irreversible investments for policy design and implementation since the policy makers gets informed at an early stage whether the results he/she expects may not materialise and, thus, he/she may be able to stop these ineffective investments. Furthermore, PICA provides a flexible structure within the four steps that can be adapted very easily to all possible agricultural, environmental, and rural policy options and institutional contexts. It allows for a low-cost and time-saving research and the results are easy to communicate to policy makers.

PICA can also play an important role within integrated modelling frameworks – like the SEAMLESS-Integrated Framework - that have been developed for an ex-ante assessment of policy impacts on environmental, economic, and social systems. Here, the economic and environmental models often assume that appropriate and required institutions are in place for resource governance towards sustainability, or that those institutions can be implemented with no costs. PICA can be seen as a method that qualifies those underlying modelling assumptions to narrow the gap between theory and the real-world. Thereby, the institutional assessment can strengthen the modelling approaches in the pre- and post-modelling phase. If PICA is applied in the pre-modelling phase, it can provide hints on whether institutional constraints in some or many countries or regions are likely to be prohibitively high and the policy option will hardly become effective there. As a result, it could be recommended - and discussed with the policy makers - to modify the policy option or to carry out additional in-depth institutional pre-studies before running the other models. Similarly, the results can be used to select and modify policy scenarios that are constructed as input for the modelling tools. When applying PICA in the post-modelling phase, it allows for putting the mainly quantitative model results and calculated impact indicators into (institutional) context. This contributes to the validation of the model results on policy impacts.

PICA is still work in progress. It has been tested in the Auvergne (France) to gain more insights for modifying and refining the procedure (see Schleyer et al. 2007b for preliminary results). Despite being an explorative tool, all PICA steps can build already on a solid basis derived from theoretical insights and empirical institutional analysis (see Schleyer et al. 2007a). Neither the current library of crucial institutional aspects (CIA) as a whole nor the lists of CIA linked to a particular policy type can be seen as static, but need to be revised and complemented continually to improve the accuracy of the predictions. Therefore, it is

essential that the experiences made and insights gained during every application of PICA are used systematically and carefully to make the empirical basis of PICA more comprehensive. Thus, the library of CIA can be seen as an ever-growing source of information. The same applies to the library of institutional indicators used in PICA Step 3 that would need constant revision. Further main avenues for improvement would also include testing the ability of the typology of policy options to actually filter the CIA properly. Is the current typology indeed able to account for those essential characteristics of a policy option that are determining the range of crucial institutional aspects relevant for this policy? Does the filter exclude CIA that may turn out to be relevant in PICA Step 2 (too exclusive)? Does the filter include (many) CIA that may turn out to be irrelevant or less relevant (too inclusive)? The preliminary testing results clearly underline the need for a constant revision or calibration of the current policy matrix with every application of PICA (Schleyer et al. 2007b). Similarly, one may ask if the typology covers those main features of a policy option that are important for the success of policy implementation. An important aspect not yet addressed by the current typology, for example, is the dimension of the bio-physical system (or natural resource system) that is addressed by a policy. Here, some crucial institutional aspects can stem from the fact that the characteristics of a natural resource addressed – or, more precisely, the attributes of a nature-related transaction that is induced or influenced by the policy - might call for specific institutional arrangements to make a policy option effective (Hagedorn et al. 2002). For instance, addressing water quality often has to deal with non-point pollution from agriculture that constitutes challenges for adequate forms of monitoring and sanctioning. Further, policies for the protection of biodiversity or specific rare species face particular incentive problems, not the least because the future value of these rare species is uncertain and the benefits of protection cannot only be reaped by the one protecting it. In addition, the geographical dimensions (local, national, or global) of resources can also be important. Thus, distinct institutional aspects for each of the natural resources addressed can be expected. This clearly illustrates that PICA needs to be further developed and the resulting concept tested as a valid and innovative tool to capture institutional dimensions in ex-ante policy assessment.

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