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Can the Concept of Integrative and Segregative Institutions Contribute to the Framing of Institutions of Sustainability?

Konrad Hagedorn

Division of Resource Economics, Department of Agricultural Economics; Workshop in Institutional Analysis of Social-Ecological Systems (WINS); Berlin Institute of Cooperative Studies, Humboldt University Berlin, Unter den Linden 6, Berlin 10099, Germany; E-Mail: k.hagedorn@agrار.hu-berlin.de; Tel.: +49-30-2093-46362

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Abstract: This paper begins with the question “What is special about those institutions that bring about sustainability”? In an attempt to answer this, I use the Institutions of Sustainability (IoS) framework, which structures sustainability analytically according to four main categories, namely: transactions, actors, institutions and governance structures. I then argue that sustainability has to do with balancing two sorts of costs an actor may face while being constrained by institutions. One is the costs from the integrative effects of institutions on his individual decision making. The other is the costs from the segregative effect of institutions. In this way, sustainability can be understood as societies’ compromise between institutions that integrate individual actors’ decisions in a wider system, holding them fully responsible for more or less all of the effects of their choices and those institutions that partly free individual decision makers from parts of such responsibilities. If a governance problem is characterized by a high degree of “decomposability”, segregative rules may be sufficient. The more a governance problem is characterized by complexity due to low modularity and high functional interdependencies, the more accurate integrative rules may be. The paper concludes by identifying “sustainability area of institutional embedding” as a regulative idea in understanding sustainability.

Keywords: institutional analysis; sustainability; transactions; interdependence; governance

1. Introduction

Economic and technological development is often associated with numerous disturbances of ecological systems and serious degradation of natural resource stocks. This impact requires an increase in the capacity of societies to regularize human behavior in a way that at least limits such adverse or even sometimes catastrophic effects. This is the reason why achieving sustainability has become an issue of institutional change and institutional innovation. At the same time, there is increasing evidence that this processes will lead to a higher degree of institutional diversity [1] and to more complex governance structures [2], because interactions between ecological and social systems, often also including technical systems, are complex and to are large extent unknown. In line with these insights, there is a growing awareness of the analytical inappropriateness of concepts that frame problems of coordination within a “market or state” dichotomy [3]. As a response to this problem, a framework for the analysis of “Institutions of Sustainability” (IoS) has emerged, that has been applied in numerous studies [4]. This research has raised new questions as regards the particular properties of institutions supportive to sustainable development: “What is special about those institutions that bring about sustainability?” Is there a special type of institution relevant for meeting the challenges of sustainability?

In those areas of the economy where humans interact closely and frequently with natural systems (often via technical systems, such as irrigation infrastructure or precision farming technology), institutions and governance structures are of particular interest for the issue of sustainability. It is argued that the dichotomy of integrative or segregative institutions (ISI) provides a better understanding of the social construction of nature-related transactions, which are typical for these sectors, than the conventional market-state dichotomy. It is the particular properties of such nature-related transactions [5] that lead to this conclusion. Nature-related transactions are mediated between actors by natural systems, often by the help of technical systems. As these systems are very diverse and highly interconnected, one economic actor’s choice to conduct a transaction may induce many other linked transactions and, in this way, produce many effects with very diverse attributes, affecting numerous other actors or groups of actors over spatial and temporal distances and through complex biophysical mechanisms. This raises the question as to what extent the sets of rules in use, together with the modes of organization that make such rules effective, should and can hold the initiators of such nature-related transaction responsible for all of these outcomes. This challenge of social construction is of high relevance in practice, because undesirable or even harmful consequences will occur under conditions of misfit between physical processes and institutional design, namely unresolved water conflicts, failing coexistence of Genetically Modified Organisms (GMO) and conventional agriculture, soil erosion and desertification, just to name a few.

Before we proceed, it is important to acknowledge that the way institutions are defined and distinguished often depends on the discipline from which the authors draw their research experiences. Most scholars in institutional analysis distinguish in some way between institutions as sets of rules and governance structures as the organizational solutions for making rules effective [3,6,7]. In contrast, others seem to prefer the notion that the term “institutions” relate to both rules and organizations. For example, Williamson [8] has introduced the terms “institutional environment” and “institutional arrangements”, the latter being more or less identical with “governance structures”, while the first

refers to those subset of rules that are formal in nature. In his “four levels of social analysis”, he locates informal institutions at the level of “embeddedness” in social traditions and norms. Although attempts to distinguish between formal and informal rules have gained popularity, it is often not clear as to how to draw a line between them. Are formal institutions those that are somewhere written down, or should we prefer a more thoughtful definition that views formal institutions as those that are explicit in the perception of the actors following these rules (see, theory of conventions; e.g., [9])? The objective to create an operational analytical framework that enables a systematic and detailed analysis of institutions is best served by differentiating rules according to levels of decision making and social interaction, as suggested and applied by Ostrom [10]. She distinguished between meta-constitutional, constitutional, collective choice and operational rules.

In this paper, I will follow the notion that “institutions”, *i.e.*, entities constructed from sets of rules, and “organization” through governance structures, used to put such rules into practice, should be seen as interlinked elements. Rather than isolating them from each other, I will treat them as elements embedded in, and representing, rules and organization in societies that affect different levels of decision making. This is a very similar understanding of institutions as the one suggested by Kiser and Ostrom [11]. Since the background of this paper resides in the search for a concept appropriate for the analysis of institutions that regularize sustainability, the institutions of sustainability (IoS) framework assumes that institutions depend on the properties of transactions related to natural systems and the characteristics of actors involved in such transactions (see [4]). By integrating a new dichotomy into this framework, we expect to distinguish those institutions that are particularly relevant when sustainability is at stake. This is what the dichotomy of integrative or segregative institutions (ISI) represents.

This is especially relevant for economists who are used to arranging their guiding concepts in dichotomies that define alternative options of social organization. In the past, “the market and the state” has been used as such a dichotomy and has dominated the framing of many issues in economic coordination. In this paper, the meaning of ISI will be demonstrated by developing an understanding of the “transaction-interdependence-institutions nexus”. It will be shown that the suggested change of the guiding dichotomy towards ISI might predominantly stimulate institutional analysis that is applied to ecological systems and natural resources. To this end, I will look at the integrative-segregative dichotomy from two perspectives, which are referred to as the physical and the social view on transactions and the costs and effects caused by them. Combining these two perspectives leads to a concept that allows for distinguishing sustainable and unsustainable states of institutional integration and segregation. Finally, a heuristic for transforming the regulative idea “sustainability” into “meta-constitutional rules” is proposed.

This approach to institutions and governance structures is complementary to the analytical procedure suggested by Ostrom [1] (p. 25), which starts with “understanding the working rules”, then discusses “where they come from” and, finally, the “rule following or conforming actions” of people. We begin with the problem of interdependence, where the origin of rules lies. To understand the dynamics of interdependence, we have to look at the properties of physical transactions. As interdependence is a part of the transaction-interdependence-institutions nexus, the influence of actors and their patterns of interaction in action situations on institutional and organizational choice are by no

means neglected and neither is the influence of the interplay of “properties of transactions” and “characteristics of actors”.

2. Towards an Understanding of Integrative and Segregative Institutions

Nature-related transactions are often associated with a complex “transaction-interdependence-institutions nexus”. Transactions of goods caused by decisions made by actors usually not only have an impact on themselves, but also affect other actors in a positive or negative way who were not involved in that decision. This may create interdependence between numerous actors and may provoke either conflict that requires solutions or synergies enabling mutual benefits from cooperation. As sustainability is closely related to physical processes [12] institutional choice in this area particularly depends on the physical nature of transactions and its consequences. Therefore, a framework for the analysis of institutional change that focuses on sets of rules and governance structures that are supposed to foster sustainability must emphasize the physical properties and impacts of transactions. Accordingly, we start with the physical perspective on transactions that may differ from other institutional approaches, for example in political science, where the primary focus is on the characteristics of actors and their relationship (see, e.g., actor-centered institutionalism [13]).

If we accept that the analysis of institutional change need not always pay equal attention to both the properties of transactions and the characteristics of actors, we may consider concentrating on either one of these aspects:

- (1) For emphasizing the relevance of transaction properties for institutional change, characteristics of actors could be subjected to the *ceteris paribus* condition. In this case, the diversity of actors would be blinded out, assuming that only “standard actors” are involved.
- (2) For emphasizing the influence of actor characteristics on institutional change, properties of transaction could be subjected to the *ceteris paribus* condition. In this case, the diversity of actors would be neglected, assuming that only “standard transactions” take place.

However, just setting the characteristics of actors *ceteris paribus* would not be reasonable. This is because the causal connection between transactions and institutions (the “transaction-interdependence-institutions nexus”) cannot be understood without including actors, their properties and capacities and their interaction. Transactions cause interdependence between actors and, thus, affect social relationships, and institutions emerge, either non-intentionally or by intentional design, as a response to such unresolved conflicts or to opportunities of cooperation. (The link between transactions in a physical sense and the interdependence of actors associated with them will be further discussed in Section 4.1). The ISI concepts elaborated in the following section will try to do justice to this Janus-faced nature of the reasons why institutions arise, exist and change. The latter can be illustrated by a “transaction-interdependence-institutions cycle”: transactions originating in decisions made by actors often affect other actors. This creates interdependence between these actors and may provoke either conflict that requires solutions or synergies that enable mutual benefits from cooperation. Therefore, the transaction-interdependence-institutions phenomenon can be seen from two different angles [5]: the (physical) transaction of a good or resource and the (social) interdependence between actors or organizations (see Figure 1):

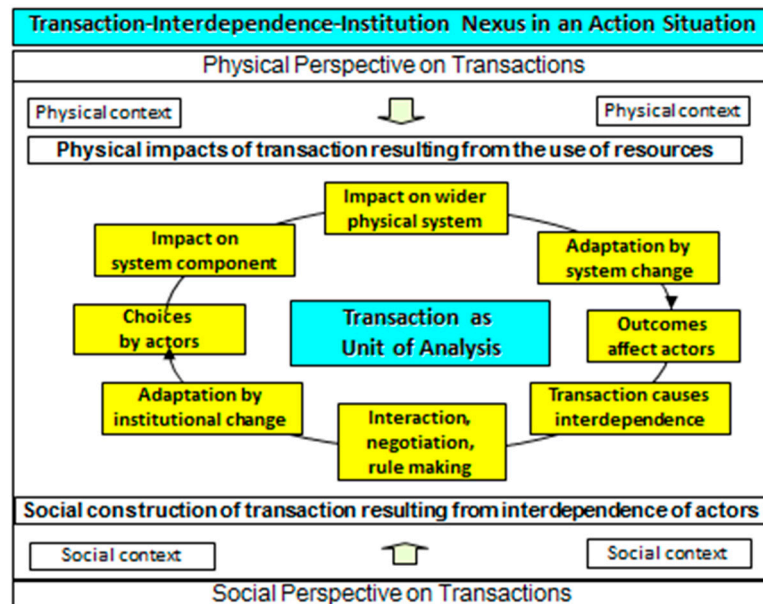


Figure 1. The transaction-interdependence-institutions cycle.

- (1) Actors choose an action (e.g., to apply nitrogen fertilizer) that entails transactions involving one or more other actors.
- (2) Such choices by resource users affect ecosystem components (nitrate in water flows into soil).
- (3) They may also impact the wider context of the physical or natural system (eutrophication of an adjacent lake).
- (4) Ecosystems and hydrological systems respond to these changes by adaptation processes (loss of parts of the fish population).
- (5) The outcomes affect other actors: a physical transaction occurs (fishermen lose part of their income).
- (6) The actors participating in the transaction recognize their interdependence regarding the use of the natural system and probably respond to it.
- (7) This stimulates interaction between actors directly (water users) and indirectly (politicians), such as discussion, negotiation and consensus-building on rule-making.
- (8) Adaptation processes in the social system (e.g., regarding rules and organization of water pollution) result in institutional change and governance reform.

As the transaction is now socially constructed, actors will adjust their choices to the new rules and enforcement mechanisms. However, the transaction-interdependence-institutions cycle may start afresh if some actors in the action situation are not satisfied with the outcome. It is important to note that this cycle is just a stylized presentation, and in reality, processes of institutional change are much more heterogeneous and context specific.

3. Integrative and Segregative Institutions from a Physical Perspective on Transactions

We start defining the terms “integrative” and “segregative” by how the consequences of decisions on transactions made by an actor are dealt with under an existing set of rules. These rules can be (more

or less) integrative or segregative. Therefore, the anticipated consequences will either be integrated in or segregated from the decision maker's area of accountability.

3.1. Consequences and Heterogeneity of Transactions

The consequences of a decision consist of three elements: First, the effects of transactions, which may be adverse or beneficial and can cause conflicts among the people affected. As physical transactions may be mediated by technical and biophysical systems, they may be subjected to transformations. For example, high nitrate levels in water caused by reinforced nitrogen leaching and transformation to nitrate due to inadequate application of fertilizer or manure can cause methemoglobinemia or also called the blue baby syndrome. This may provoke severe conflicts between the parents of the sick babies and polluting farmers. Second, the process of the transaction itself incurs transaction costs and therefore raises the question as to who is obliged to bear them. For example, nitrogen leaching as an unintended side effect (nevertheless to be expected) of crop growing certainly goes without special transaction costs, but monitoring and restricting this "adverse external effect" causes considerable costs of information, measurement, monitoring and coordination. Third, transaction costs reflect the resources used to govern this interdependence. For example, in the case of nitrogen leaching, the transaction costs occur in different policy areas, such as water policy, where maximum thresholds for nitrogen in drinking water are defined and agri-environmental policies deal with constraints on cultivation practices, liability and enforcement mechanisms. However, internalization logic might be applied to assess whether an institution is appropriate to regularize this type of interdependence: "Those who have caused costs should also bear these costs, and benefits should accrue for those actors who have produced them." Section 5.1 will show, however, that this issue deserves a more thoughtful discussion.

One more aspect is crucial for understanding the research problem this paper addresses: transactions differ in both processes and effects, and thus, the interdependence between actors that they cause and the task to regularize them by institutions also differ. If all physical transactions were simple as regards both the process and effects of transactions, the concept of segregative and integrative institutions would be without meaning. However, if the processes of the transaction are complex and the effects are numerous and affect heterogeneous actors, the question arises as to what extent the produced costs and nuisances, or benefits and amenities, should exclusively be left with those who decided the transaction or may be relocated to others. In other words, only in such cases does the question of how much integration or segregation should be achieved by means of setting and implementing rules become relevant. The example of nitrogen fertilizing introduced above represents such a complex transaction with a variety of both desired and problematic effects and a complicated action situation. Applying high amounts of nitrogen or manure in crop growing certainly increases yields and may, under certain, conditions also improve soil fertility. However, these beneficial effects are usually accompanied by numerous adverse effects that also affect people other than farmers. It cannot only cause the blue baby syndrome via water pollution, but may also contribute to the emission of a greenhouse gas (N_2O), indirectly reducing biodiversity and resulting in high nitrogen content in food, like vegetables or lettuce; and all of these effects imply difficult and even unknown bio-chemical and geo-physical transformations. Selling bricks may serve as a contrasting example where both the

transaction process and the structure of the effects are rather simple and the question of integration and segregation does not arise.

3.2. Processes and Effects of Transaction

Transactions refer to physical objects (for example natural and ecological entities) and, thus, represent the physical dimension of the interactions between actors regularized by institutions. This understanding of a transaction, which emphasizes transference over a technically separable interface, may be biased because it focuses on physical movements. Transactions can also be defined by emphasizing the social dimension instead of the physical dimension. From this point of view, a transaction is a change in social relationships that may or may not result in a movement of physical objects. It is the change in individual rights and mutual obligations that constitutes a transaction in this perspective [14] (pp. 66f). When starting with the physical view on transactions, the following two implications are important.

First, the properties of the good or the resource being transferred are not important *per se*, but this gains importance only when it comes to a transaction of a unit of the good or resource. For example, the toxic influence of nitrate in groundwater on babies only exists if somebody causes too much nitrogen leaching; or physical open access to common grassland only leads to degradation when pastoralists actually use and overuse this land. It is important to note that transactions are usually not only influenced by the particular good or resource in question, but also by other goods, resources and physical circumstances. For example, nitrogen leaching depends much on the soil quality and geological conditions; or for instance, overgrazing becomes a problem differing across years, because of weather differences.

Second, the process of transaction by which the good or resource is transferred is relevant. New institutional economics defines a transaction by means of a technically separable interface, where one stage of activity terminates in a system of production and provision and another one begins. A transaction may be simple, for example, if only one physical entity that is homogenous and visible has clear boundaries and is not connected with any non-intended effects and implications concerned (like selling bricks). However, transactions may also be complex (like nitrogen application), for example, non-visible, without clear boundaries, showing physical heterogeneity, consisting of many sub-units and dimensions, involving numerous actors, causing diverse and often hidden side effects and causing even impacts over a long time that may even affect future generations. Transparency in such transactions and monitoring them would require information that is also connected with insecurity and risks for the actors involved. This knowledge problem seems to be more crucial for ecological systems than for engineered systems. Engineered systems show a high degree of modularity, and only decomposable systems can be simple. Transactions related to natural systems are complex, often not standardized, even unknown. Transaction impacts may go unseen with hidden causalities. As transaction costs can be high under such conditions, the question as to who should be accountable for these costs becomes a particularly relevant economic question here. Providing a set of rules on this very issue is the first task of ISI, as shown in Table 1. Integrative institutions consist of rules that hold decision makers liable for the transaction costs that they cause, *i.e.*, they have the duty to internalize them and no right to externalize them. Segregative institutions soften this restriction maybe to different

degrees and relieve decision makers from transaction costs and burden others with them (For simplicity, the properties of integrative and segregative institutions are always described in a polarizing way in Table 1 and also in Tables 2–5. It might be more adequate to think of this relationship in terms of a continuum, because an institution can be more or less integrative and segregative, respectively).

Table 1. Impact of integrative and segregative institutions on transaction costs.

Physical View on Transactions	Integrative Institutions	Segregative Institutions
Internalizing transaction costs	Duty to internalize	Incomplete duty to internalize
Externalizing transaction costs	No right to externalize	Some rights to externalize

Third, the effects of the transactions on actors and their relationships can also be very different. These effects can be beneficial and adverse, as seen from the point of view of the actors concerned. As engineered processes of production are often based on systems of decomposable transactions, the latter may often have only a small number of simple effects. The effects of transactions that relate to natural resources and, therefore, often represent interventions in and disturbances of ecological systems are often numerous and complex. They often include side effects that may be welcome or undesired, foreseen or unexpected. For such transactions, the question of who is allowed to profit from or who has to accept liability is much more relevant. Here, we see a role of ISI that is similar to that in Table 1. It provides sets of rules on the distribution of the positive and negative effects of a transaction to the decision makers and those who did not make the decision, but are concerned, as shown in Table 2. Integrative institutions are rules that make the decision makers eligible for the beneficial effects they cause and hold them liable for the adverse effects. Segregative institutions allow deviating from this logic, so that the decision makers may forego some benefits, which then accrue for others; however, their liability for some adverse effects may also be reduced, and others have to accept the nuisances. We will come back to this issue, which has always been considered a central question in institutional economics, and discuss it in more detail in Section 5.1.

Table 2. Impact of integrative and segregative institutions on the effects of transactions.

Physical View on Transactions	Integrative Institutions	Segregative Institutions
Beneficial effects	Appropriate all benefits and leave no gains to others	Forego some benefits and leave gains to others
Adverse effects	Accept all liability and shift no nuisance to others	Deny complete liability and shift nuisances to others

3.3. Definitions of Integrative and Segregative Institutions Derived from a Physical Perspective on Transactions

These brief illustrations show that the model of thought that distinguishes these two particular classes of institutions (ISI) can be considered as a response to the observation that many transactions induced by humans have become very complex, in particular if they are not related to engineered production and distribution systems, but to self-organized eco-systems. It is the increasing occurrence of such cases that makes the following two questions relevant:

- (1) What kinds of effects of the activities is an actor expected to be accountable for? This refers to both transaction costs coming up in the process of the transaction and the final beneficial and adverse effects of such processes: to what extent is internalization of the transaction cost compulsory, and how much externalization of the transaction cost is tolerated? Which process yielding beneficial effects is an actor permitted to initiate and from which to appropriate the positive results and which adverse effects is an actor allowed to cause and for which to leave the negative outcomes to others? As there is no full information and incomplete transparency on the many effects that will materialize in the process of a transaction, for example during the production and provision of a collective good, it is important at which stage of the process entitlements to beneficial effects or the liability for adverse effects become effective (see also Section 5.1). This issue is particular relevant when innovations associated with a high degree of insecurity are implemented.
- (2) How and to what extent should institutions (and governance structures) be integrative or segregative in attributing or not attributing transaction costs, adverse and beneficial effects to the specific actors involved or affected? In addition, such institutions (and governance structures) should have the capacity to identify those eligible or liable and to select and delineate the effects in a precise and reliable way. Not only single rules, but arrangements of different rules and combinations of different types of governance may be necessary for this purpose. Individuals may like to exploit benefits, avoid cost and to reduce complexity. However, the social choice situation is different and implies balancing costs and benefits for society and distributing them in a way that stimulates fruitful dynamic changes, for example by processes of learning and innovation. This is what a proper composition of integrative and segregative institutions (and integrative and segregative governance structures) is expected to achieve, and we will come back to this expectation in Section 5.4.

From these general notions, we can now extract operational definitions of ISI. It seems plausible that these definitions have to be derived from the impacts produced by the transactions that these institutions attribute to the actors involved. Integrative institutions allow actors, who make decisions on transactions, not only to profit from beneficial effects, but they also hold them fully liable for adverse effects. Similarly, they not only force them to internalize the transaction costs they cause, but also protect them against transaction cost resulting from the activities of other agents. Decision makers enjoy all benefits and bear all costs of their own decisions, and other actors can be sure that decisions made by others will cause them no gains or nuisances. On the other hand, segregative institutions force actors who make decisions on transactions to refrain from receiving all gains from beneficial effects, but also allow them to shift some of the nuisances resulting from adverse effects to other actors. They may externalize transaction costs within limits, but cannot also avoid bearing transaction costs caused by decisions made by others. Decision makers forego benefits and avoid costs, although they have caused them, and actors who have not participated in decision making will have costs and enjoy benefits. In other words, ISI establishes different incentive structures, which, over time, lead to different actor orientations and economic behavior. Integrative institutions require learning processes on how to organize “the whole”, while segregative institutions induce learning processes including only a part of the bundle of costs and effects of the transactions concerned. The same applies to the

perceptions and motivations that actors develop. In other words, integrative institutions coordinate decision making by means of a “system approach” to learning and knowledge dissemination. Segregative institutions coordinate decision making by means of a “part-of-the-system approach” to learning and knowledge dissemination. This has consequences for the speed of change and the ways in which the benefits from changes can be appropriated by actors and groups.

4. Integrative and Segregative Institutions from the Social Perspective on Transactions

Integrative or segregative institutions do not internalize or externalize the transaction costs and effects of transactions directly. They do so by creating the willingness and capacity of actors to do so. The segregating or integrating order established by the institutions enables them to solve or at least reduce the conflicts caused by the transactions. This aspect has not been discussed in the preceding sections, because we have restricted the discussion to the physical view on transactions for defining ISI. We now change our perspective and look at the social dimension of transactions, which refers to actors and their interdependence, to learn what this may contribute to our understanding of ISI.

4.1. Transactions and Interdependence

Transaction costs, for example costs of information or negotiation, clearly result from intended, ongoing or past transactions that have affected different actors. In other words, transactions cause or reveal interdependence between actors. “Interdependence occurs when a choice of one agent influences that one of another...Interdependent agents cannot simultaneously realize their incompatible interests in scarce environmental resources and their conflicts must be resolved by defining (or redefining) initial endowments” [15] (p. 356). Strictly speaking, transaction costs do not exclusively result from the physical procedure of transferring a unit of a good, service or resource from one point to another, but in particular from how the actors involved prepare for or respond to this physical change, which may have caused a conflict by incompatible use of natural resources between them. Accordingly, transaction costs could also be called “interdependence costs”. Obviously, we deal with a phenomenon in which the physical and the social dimensions are closely intertwined. “Interdependence has two distinct sources: the attributes of the resource and the attributes of the user” [15] (p. 356). Can actors find institutions and governance structures that help them to solve these conflicts (or use the opportunities for cooperation) brought about by their interdependence? Should institutions form their relationships in a more integrative or more segregative manner to arrive at this objective? These questions lead us to an actors-oriented concept of the integrative-segregative dichotomy.

4.2. Different Understandings of Integrative and Segregative Institutions

The term “integrating institutions”, without reference to an opposite notion of institutions, is occasionally used in the literature for the integration process of the European Union (see, for example, [16,17]; for integration processes in the EU, see also [18]). Some authors use the terms integrating institutions for very specific aspects of the EU, for example for integrating environmental policies into the policy making of the EU and its member states or with reference to the Lisbon Process [9]. This reflects a rather specific use of the term not aiming at theoretical generalization.

Kenneth Boulding has distinguished three main forces that play a dominant role in the organization of social relationships: “exchange”, the “threat system (fear)” and the “integrated system (love)” ([19] (p. 34); [20] (pp. 1–13; 103–122)). “The integrative system...involves such things as status, identity, love, hate, benevolence, malevolence, legitimacy—the whole raft of social institutions which define roles in such a way that you do things because of what you are and because of what I am, that is, because of some kind of status or respect” [20] (p. 44). However, Boulding does not apply any institutional analysis to these systems, but describes the values they implicitly establish. “Economics clearly occupies the middle one of these three. It edges over towards the integrative system insofar as it has some jurisdiction over the study of the system of one-way transfers of exchangeables, which I have called the ‘grants economy’, for the grant...is a rough measure of an integrative relationship. On the other side, economics edges towards an area between the threat system and the exchange system which might be described as the study of strategy or bargaining” [21] (p. 3).

Talcott Parsons [22–24], in his functional theory of social action, distinguishes four main institutional functions in a society: pattern maintenance, which refers to social structures, goal-attainment by solving the problem of economic allocation, adaptation as a consequence of the plurality of objectives and integration. Solving the functional problem of integration requires mutual adjustment of segmented units or subsystems as regards their contributions to the effective functioning of the system as a whole. Particularly in complex societies, the system of legal norms together with the legal system represents the main integrative mechanism. The predominant role of the system is seen in the allocation of rights and obligations. This integrative function of social systems is considered to be crucial for maintaining collectivity in society. Seibel [25] (p. 18) emphasizes the integrative role of deviating behavior. “In highly differentiated societies, usually special institutions, for example, the bureaucratic administration of a centralized political organization, keep society integrated. In undifferentiated societies without such unifunctional institutions, some of the more basic multifunctional social processes have to fulfill that function. Such a basic process is social deviance that is not just an outburst of antisocial tendencies but serves an integrative function in itself and/or in conjunction with subsequent sanctioning processes. Simple societies cannot afford the luxury of wasting the integrative potential of social deviance, whereas highly differentiated societies can, and do”. Tonoyan [26] uses the term “integrating institutions” in an analysis of corruption.

In the literature on the democratic regulation of ethnic conflicts, the dichotomy of integrative and consociational institutions plays a role. Lijphart’s [27] consociational model and Horowitz’s [28] integrative model have stimulated both empirical and theoretical debate in this area. Although both approaches follow the objective to achieve a lasting settlement by means of inclusive rule, they differ in strategy. In Lijphart’s model, the new political structure is based on the recognition of ethnic groups. In order to overcome ethnic conflicts, the ethnic elites should cooperate on institutions that explicitly take into account the different ethnic groups and establish rules of governance that are based on their cooperation. In contrast, the political structure suggested by Horowitz bridges the ethnic divisions. He criticizes the missing incentives for cooperative behavior of the elites in the above model and aims at providing these by an electoral system in which a candidate of an ethnic group must attract votes from another ethnic group for being elected. Caspersen [29] (p. 571) has applied these models to postwar Bosnia. The role of integrative institutions is also analyzed in other publications on ethnic conflict and multiculturalism, for example in a cross-country study by Premdas [30].

Integrative institutions are contrasted with “aggregative” institutions by Olsen and March [31] (Chapter 7). This notion of integrative institutions is “rooted in a republican or communal understanding of the world, emphasizing the need for bonds between the members of the institution to secure supra-individual goals of survival, and the obligation for the participants to actively reinforce those bonds by participation in political life. So, a departure is taken from the collective, and individual action is judged on the basis of its contribution to the common good. In return, minorities have guarantees against systematic defeat by a majority. Politics in such a setting deals to a large extent with establishing and confirming the purposes of the collectivity and maintaining the support of members by securing their trust in the common good...Since the overarching issue is persistence of the community, participation in political life is linked to continuing membership of a deliberating community and participants are expected to raise voice on issues beyond their personal material interests” [32]; [33] (p. 5). This requires a matching institution: “Integrative institutions achieve consensus and legitimacy by deliberation and rational debate. The role of public actors within them is to serve as trustees of the public good, articulating collective aspirations and shaping others’ preferences to create new shared understandings of the common interest” [34]. On the other hand, aggregative institutions originate from the “enlightenment revolutions of the late 18th century in the USA and France which inspired most Western democracies as they unfolded during the 19th and 20th centuries, building up contractual relations between political actors. The aggregate perspective commences with the individual, giving him...certain rights that protect him from undue interventions from the state, but at the same time those rights make it possible for him to have a say in how the state rules the society. Participation in public affairs is mainly linked to material interests...; political parties and interest organizations function as watch dogs for such interests, relieving the individual from the arduous task of continuously pursuing political goals. The political leadership is seen as an intermediary between competing material interests, always bound to decide along the lines supported by a majority among politically active actors. Institutions and procedures are organized so that they guide actors to perform according to their preferences, under the assumption that any action is countered by action by other actors, thus creating continuous processes of weighing and counter-weighing interests. Participation in political life therefore is partial, and linked to an active, and mostly personal, material interest in the allocation of goods and values; when the issue has been settled, one withdraws from the scene—but one is ready whenever new initiatives are felt to be necessary” [32,33] (p. 5). “In aggregative institutions...political processes are characterized by strategic, self-interested behavior. Policy outcomes reflect the results of coalition-building and bargaining. Here, public actors act as brokers, mediating and forging compromises among potential supporters in an effort to arrive at Pareto-optimal outcomes” [34]. Integrative institutions reflect “a logic of unity”, and aggregative institutions follow “a logic of exchange” [31] (p. 126).

4.3. Definitions of Integrative and Segregative Institutions Derived from a Social Perspective on Transactions

We will build on the notion of integrative and aggregative institutions outlined in the last paragraph to develop an appropriate understanding of the dichotomy. This will be done from a social perspective on transactions by demonstrating the differences between these two types of institutions. These are

characterized in Table 3. The criteria listed in the right column show that aggregative and segregative describe the same situations, although they approach these in a slightly different way. If citizens are aggregated into clusters by procedures like majority voting, bargaining, coalition building, rent seeking or logrolling, these procedures produce a segregation of society into groups of people who, for example, could influence decisions and others who could not and groups who profit from transactions and others who suffer from the nuisances caused by them.

Table 3. Attributes of integrative and segregative institutions.

Social Structures	Integrative Institutions	Segregative Institutions
The people	A group	Cluster of individuals
Will of the people	Deliberated	Bargained
Base of order	Reason	Exchange
Leadership	Trusteeship	Brokerage
Change	Adaptation	Instantaneous
Majority rule	Curbed by norms	Dominant
Policy outcome	Shared purpose and trust	Allocation of resources
Loyalty of agents	Professional integrity	Incentive compatibility

Source: categories based on Bogason [32]; [33] (p. 6); March and Olsen [31] (pp. 118,119).

Not surprisingly, there seems to be a congruency between the two views of ISI derived from the physical and the social view on transactions: the more necessary and/or difficult the task of integration is, which institutions face at the physical level of transactions (processes with complex and non-decomposable transactions and numerous and diver effects of the processes of transaction), the more integrative institutions must be at the social level of transactions. The more segregation is sufficient and/or integration is easy at the physical level of transactions (processes with simple and decomposable transactions and only a few and similar effects of the processes of transaction), the more segregative institutions may be at the social level of transactions. However, the congruency is perhaps not completely symmetric. Institutions that are integrative at the social level will perhaps not always be associated with institutions working integratively at the physical level (and *vice versa*). For example, a community that is rich in trust, knowledge and communication may arrive at the conclusion that accepting some nuisances caused by their entrepreneurs is in the interest of the community as a whole, because this helps the entrepreneurs to be innovative and remain competitive and secures employment opportunities. This suggests that diverse action situations may exist in which actors have sufficient reasons to deviate from the simple symmetry referred to above.

In Section 3.2, we asked the question what ISI, from a physical perspective on transactions, are expected to effectuate as regards the internalization and externalization of transaction costs and also the liability for adverse effects or entitlements to beneficial effects (see Tables 1 and 2). Now, we ask the same question for ISI defined from a social perspective on transactions. As shown in Tables 4 and 5, we assume different properties of the processes of transactions and of the resulting effects, which may differ considerably. Accordingly, the kind of interdependence between actors caused by them may be very different, too. Transactions that are simple, engineered and decomposable can usually be more easily coordinated, require knowledge that is already available and cause less severe disagreement among actors. Transactions related to natural systems are often complex and interconnected. This makes it

less transparent and sometimes even incalculable for the actors, so that there is a greater scope of conflicts and opportunism. The same may apply if we compare transactions producing only a few and similar effects and those which have numerous and diverse effects. These characteristics are crucial for the choice between institutional segregation and institutional integration at the social level (see Tables 4 and 5).

Table 4. Integrative and segregative institutions and different transaction processes

Social View on Transactions	Integrative Institutions	Segregative Institutions
Simple, engineered and decomposable transactions	Not necessary	Sufficient
Complex, nature-related and interconnected transactions	Required	Inappropriate

Table 5. Integrative and segregative institutions and different effects of transactions

Social View on Transactions	Integrative Institutions	Segregative Institutions
Only a few and similar effects	Not necessary	Sufficient
Numerous and divers effects	Required	Inappropriate

Having now defined what we understand as being ISI, it is important to note that we restrict our definitions to what ISI are expected to achieve. In other words, our first objective is to clarify the desired functions of the institutions. I do not explore in this paper what concrete design of institutions may be able to perform in the respective ways and how such institutions can be designed, although this is a relevant question that needs to be tackled.

4.4. Integration and Segregation: Relevant Issues of Interplay

I also have not clarified the question up to now of whether integration or segregation always happens directly by the institutions or rather by governance structures that make institutions effective. Is the integrative or segregative capacity contained in the institutions or in the governance structures, or will it only materialize by a well-designed interplay of institutions and governance structures? The same set of rules can often be put into practice by several types or combinations of governance structures, which may differ with regard to their integrative or segregative impact on those decisions that they are expected to govern. For example, the market position of farmers can be protected by antitrust laws (a set of formal rules), but also by a system of cooperatives (a governance structure). In the latter case, property rights on the farmers' assets remain rather segregative (e.g., private property rights for land), but a collective form of organization integrates a beneficial effect of farmers' market transactions into their own domain: countervailing market power against companies that might dominate the agricultural trade otherwise.

However, one could argue that establishing this governance structure may leave those property rights untouched, but requires a new set of rules that enable cooperation. Thus, we can suppose that integration and segregation can be achieved with different kinds of rules and at different levels of rulemaking, which, in turn, can be linked to different and even combined governance structures to become effective. In this paper, such questions will not be explored in great details, although this would certainly be relevant for actually applying the concept of ISI to concrete issues. Similarly, the

question arises whether an appropriate degree of institutional integration and segregation, respectively, can be achieved by combining different institutions. This might occur when one transaction is governed by different sets of integrative and segregative rules at the same time. However, this usually produces a problem well known as inappropriate institutional interplay [35]. To avoid such governance conflicts, boundaries or the domains of such institutions would need to be specified. However, governing every single transaction through a specific institution would be prohibitively expensive. These costs of aggregation and scaling illustrate the challenges of the praxis of crafting institutions.

4.5. The “Integrative-Segregative Dichotomy” and “Internal and External Effects”

ISI sounds similar to a concept economists are used to: “internal and external effects”. However, it is important to be aware of the difference. This is even more recommended, as internal and external effects are often not properly understood. In particular, two popular definitions in applied economics are not compatible with the view developed in this paper. First, comparing the economic behavior of private agents with a social optimum as a frame of reference is problematic. Externalities occur when production or consumption decisions of one actor affect the utility of another actor in an unintended way and when no compensation is made by the producer of the external effect to the affected party. If an adverse externality exists, private and social costs/benefits differ. This definition is based on a welfare economics view, which differs from the institutional perspective that looks at actors in action situations, simultaneously motivated and constrained by the physical and institutional world that they live in. In the ISI concept, the terms “integrative” and “segregative” do not refer to the question of whether or not elements of cost and benefits are made a part of an overall welfare optimization. Secondly, the consequences of the limited coordination capacity of market mechanisms are often ignored. Due to their physical properties, some (positive or negative) goods and services lack excludability and rivalry and cannot be traded on markets. In this sense, they are external to the governance structure “market”, but not necessarily external to any governance structure, such as cooperation or hierarchies [36]. As institutional analysis would not give *a priori* methodological priority to markets over other types of governance, this view is hardly convincing.

In the ISI concept, the terms “integrative” and “segregative” do not refer to the question of whether or not goods or actors providing them can be included in or excluded from organizations, like markets. Strictly speaking, the latter equally applies to other types of governance, such as bureaucracies and cooperatives. For example, neither does the term “integrative” refer to the includability of an individual into collective action organized by cooperative governance for the provision of a common good, service or resource, nor does the term “segregative” refer to the excludability of an individual from the use of a private good, service or resource under market governance. This does not mean that such processes cannot originate from the impact of integrative or segregative institutions. For example, if the effects of transactions are widespread, they may affect many people, and this may imply that integrative institutions for covering most of these effects (e.g., spillovers) also must lead to the inclusion of many people. Nevertheless, the starting point is the processes and effects of transactions.

An interpretation of “internalizing and externalizing effects” that is, in principle, compatible, but not identical, with the ISI concept can be found in property rights theory. However, here, the question arises whether it really describes what the institutions actually effectuate. “What converts a harmful or

beneficial effect into an externality is that the cost of bringing the effect to bear on the decisions of one or more of the interacting persons is too high to make it worthwhile, and this is what the term shall mean here. ‘Internalizing’ such effects refers to a process, usually a change in property rights, that enables these effects to bear (in greater degree) on all interacting persons” [37] (p. 374). In other words, internalization is an act performed by the actors participating in the decisions. In contrast, what institutions, like property rights, actually do in this case is to include the effects in the decision making procedures of the actors by exposing them to corresponding incentive structures. “A primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities. Every cost and benefit associated with social interdependencies is a potential externality. One condition is necessary to make costs and benefits externalities. The cost of a transaction in the rights between the parties (internalization) must exceed the gains from internalization. In general, transacting cost can be large relative to gains because of “natural” difficulties in trading or they can be large because of legal reasons” [37] (p. 347). Such internalization may be achieved by both integrative and segregative institutions, because both subject the actors to institutionalized incentive structures. In the terminology of property rights theory, all transaction costs and effects of transactions that are exposed to either integrative or segregative institutions are called “internalized”, and only those remaining “externalized” do so because the costs of setting up ISI are higher than the benefits.

5. Merging the Physical and Social Views of Integrative and Segregative Institutions

5.1. Balancing and Sequencing the Impact of Integrative and Segregative Institutions

At first glance, everybody may agree that institutions should be more integrative in nature if they are supposed to be in line with the principle of sustainability. Inappropriate agricultural practices that do not integrate concerns for nature conservation may endanger the resilience of eco-systems. Excessive energy consumption is detrimental to the stability of the global climate, because it does not internalize the greenhouse effects. Profit-oriented tourism may destroy rural cultures if it does not take into account its impact on rural society. Many examples of this sort, which call for integrative institutions, could be collected. Daly’s [38] plea for recognizing the complementarity of man-made and natural capital is nothing else than a recommendation of an integrative strategy. However, an analytical framework focusing on ISI must be able to produce a more balanced assessment. It should be easily understandable. For example, an entrepreneur who wants to apply a new technology faces the problem, which is more or less unknown, of how serious and costly the side effects of this new technology will be and for whom these side effects will accrue. If society holds him responsible for all possible side effects, he will hesitate to make use of the innovation, because his liability could ruin his firm in the future. If many or all entrepreneurs respond in this way, neither they themselves nor consumers and other actors, like politicians, will learn fast enough about the real progress and dangers associated with new technologies. Simultaneously, everyone foregoes the potential gains from the innovation process. It can be reasonable to allow for some segregation in order to maintain dynamic sufficiency regarding economic and social processes. This brings us back to the popular internalization logic already critically addressed in Section 3.1, which assumes that all transaction costs and the effects of transactions should be borne by those who caused them.

It is well known in institutional economics that Coase [39] raised this point already. He complained that economists usually expect that all nuisances resulting from production activities should be averted, for example by government intervention. “While most economists seem to be under the misapprehension concerning the character of the situation with which they are dealing, it is also the case that the activities which they would like to be stopped or curtailed may be well socially justified. It is all a question of weighing up the gains that would accrue from eliminating these harmful effects against the gains that accrue from allowing them to continue” [39] (p. 26). However, this is not the starting point of the train of thought that leads Coase to this conclusion. Before arriving at that statement, he points out in the first step why this decision-making problem cannot be avoided. This explains why it is necessary to make basic and well substantiated decisions on actors’ rights to externalize and corresponding duties to internalize the effects of transactions. He initially assumes that rearrangements of legal rights will be done through the market whenever this leads to an increase in the value of production. This implies that market transactions are costless. “Once the costs of carrying out market transactions are taken into account it is clear that such a rearrangement of rights will only be undertaken when the increase in the value of production consequent upon the rearrangement is greater than the costs which would be involved in bringing it about. When it is less, the granting of an injunction (or the knowledge that it would be granted) or the liability to pay damages may result in an activity being discontinued (or may prevent its being started) which would be undertaken if market transactions were costless. In these conditions the initial delimitation of rights does have an effect on the efficiency with which the economic system operates. One arrangement of rights may bring about a greater value of production than any other. But unless this is the arrangement of rights established by the legal system, the costs of reaching the same result by altering and combining rights through the market maybe so great that the optimal arrangements of rights, and the greater value of production it would bring, may never be achieved”.

After this explanation, Coase shows in the second step how such decisions should be made to serve the common interest. For this purpose, he explicitly refers to his empirical studies on the behavior of courts. “The problem which we face in dealing with actions which have harmful effects is not simply one of restraining those responsible for them. What has to be decided is whether the gains from preventing the harm is greater than the loss which would be suffered elsewhere as a result of stopping the action which produces the harm. In a world where there are costs of rearranging the rights established by the legal system, the courts, in cases referring to nuisance, are, in effect, making a decision on the economic problem and determining how resources are to be employed” [39] (p. 27). It is this premise that leads Coase to criticize the Pigouvian tradition. First, he argues that a liability rule that demands that an actor who has caused damage to another one must fully compensate him or her by paying the market value of the damage cannot be justified. The latter may, for example, save costs by giving up the production activity suffering from the nuisance. Secondly, adjustments in factor allocation will take place, which reduce the net losses. In other words, an opportunity cost approach that takes into account all (or at least the main relevant) changes in the economic system as a whole is required instead of only referring to the market value of damages. He responds in the following way to the “railway example” used by Pigou [40] (pp. 129ff.) and his conclusion that railway companies should be held liable for the damage done to surrounding fields and woods by sparks from railway engines: “How is that the Pigouvian analysis seems to give the wrong answer? The reason is that Pigou

does not seem to have noticed that his analysis is dealing with an entirely different question. The analysis as such is correct. But it is quite illegitimate for Pigou to draw the particular conclusion he does. The question at issue is not whether it is desirable to run an additional train or a faster train or to install smoke-preventing devices; the question at issue is whether it is desirable to have a system in which the railway has to compensate those who suffer damage from the fires which it causes or one in which the railway does not have to compensate them. When an economist is comparing alternative social arrangements, the proper procedure is to compare the total social product yielded by these different arrangements” [39] (p. 34).

By preferring this interpretation of efficient economic behavior, Coase implicitly assumes the position that social responsibility is a norm that is superior to individual liability. “The belief that it is desirable that the business which causes harmful effects should be forced to compensate those who suffer damage (...) is undoubtedly the result of not comparing the social product obtainable with alternative social arrangements” [39] (p. 40). In line with this argument, he shows in his smoke-pollution example that a pollution tax will not necessarily lead to an optimal solution. “An increase in the number of people living or of business operating in the vicinity of the smoke-emitting factory will increase the amount of harm produced by a given emission of smoke. The tax that would be imposed would therefore increase with an increase of the number of those in the vicinity. This will tend to lead to a decrease in the value of production of the factors employed by the factory, either because a reduction of production due to the tax will result in factors being used elsewhere in ways which are less valuable, or because factors will be diverted to produce means for reducing the amount of smoke emitted. But people deciding to establish themselves in the vicinity of the factory will not take into account this fall in the value of production which results from their presence. This failure to take into account costs imposed on others is comparable to the action of a factory-owner in not taking into account the harm resulting from his emission of smoke. Without the tax, there may be too much smoke and too few people in the vicinity of the factory; but with the tax there may be too little smoke and too many people in the vicinity of the factory. There is no reason to suppose that one of these results is necessarily preferable” [39] (p. 41). At present, there is no longer any serious disagreement about this meaning of social costs. Coase’s interpretation serves as a basis for the understanding of the term “internalization”, at least as it is used in the concepts of pollution control policies. It can be found in many textbooks of environmental and resource economics where damage costs, when compared with abatement cost, are conceived of as opportunity costs and the value of damage is determined by its shadow price [12]. Alternatively, the benefits and costs of pollution are compared. This is compatible with the following demand of Coase [39] (p. 44): “If factors of production are thought of as rights, it becomes easier to understand that the right to do something which has a harmful effect (such as the creation of smoke, noise, smells, *etc.*) is also a factor of production”.

As indicated by Coase, the issue of getting the actors’ rights to externalize and duties to internalize the effects of transactions rights arises, because transaction costs do exist. The concept of ISI (in its social perspective on transactions) makes transaction costs related to institutions with different integrative and segregative capacity regarding the regularized behavior of actors an explicit element of the comparison between different institutions and governance structures. Coase has also shown that answering the question of whether external effects of transactions should be based on an opportunity cost approach that takes processes of adjustments in factor allocation into account. The concept of ISI

approaches the same question by considering two different, but interrelated domains, where transaction costs, opportunity cost, risk and uncertainty, trade-offs and behavioral adjustments play a role: the physical and the social characteristics.

It is not trivial at what stage in the decision making process on ISI becomes effective. For example, in the centrally-planned economies of the former socialist countries, rules for income distribution and social security were integrated “too early” in the economic process, *i.e.*, already in the production and provision activities. Due to the resulting distortion of economic incentives, losses of efficiency were caused. In social market economies, rules for the same purpose are more segregated from the domain of production and provision, and its burdens become effective after income has been generated.

5.2. Extending Coase’s Perspective in the Concept of Integrative and Segregative Institutions

What humans consider as costs (or benefits) cannot just be derived from the physical dimensions of use. This would neglect the constructs of rules and norms. This means that ISI not only refers to the mode of decision making, but also to the outcome of the decision making on how to regularize the interdependence between actors that results from physical transactions. Evaluating the outcome of such dynamic processes that occur by patterns of interactions in action situations is not a new question in institutional analysis of social-ecological systems. The Institutional Analysis and Development (IAD) framework used by the Bloomington School has explicitly established evaluative criteria that the actors concerned apply in order to assess the outcomes of their collaboration: “efficiency and equity, adaptability and resilience, accountability and conformance to general morality” [1]. In other words, the scholars developing the IAD framework were well aware that evaluating the outcome of actors’ interactions in action situations cannot be based only on traditional views, such as the conventional “internalization logic”. This list of the evaluative criteria could be extended, for example, following various concepts of sustainability, like the economic concepts of sustainability from Robert Solow, John Hartwick and David Pearce, or the entropy view by Herman Daly and Nicholas Georgescu-Roegen, or the ecological concept of “stability and resilience” [12]. However, the question arises of whether this is sufficient. In reality, actors also evaluate the outcome of decision-making from the point of view whether it is “fair”. In other words, social justice has to be considered as a constitutive element of institutional analysis. This extension of evaluating the outcomes “recognizes social justice as an integral part of the environmental decisions” [41] (p. 94). In such action situations, social justice, *i.e.*, designing fair solutions to conflicts as regards attributing rights and duties on the use of natural resources, will be an integral part of robust institutions, because if such solutions are not seen as fair by the actors involved, they are unlikely to be sustainable.

This adds an important aspect to the above-mentioned transaction-interdependence-institutions nexus. It suggests that the choice of institutions is rather a matter of social justice than of economic efficiency. At first glance, it seems this question could be easily solved as in traditional institutional approaches of “who gets what” as the main issue. In other words, this would be only about the question of who are supposed to be the winners and losers, which would only be appropriate if we assume that actors just seem to increase their personal utility. However, norms and values of actors are more diverse and complex in reality than what has been pointed out by contrasting views on these questions, such as Arild Vatn, who distinguishes between “individual/selfish rationality” and “social

rationality” [42]. Paavola even argues that we should acknowledge the existence of “radical pluralism”, which he understands as “the coexistence of incommensurable ethical premises of behavior which can be informed by utilitarian, non-utilitarian, consequential or the ontological ethics” ([41] (p. 96); [43]). He refers to the popular recommendation of introducing emissions trading as an instrument of climate policy, because it increases social welfare. However, for some actors, gains in social welfare may not justify emissions trading, because they insist on freedom from involuntary exposure to climate change impacts. They might object to being exposed to risks and harms from something to the creation of which they have not contributed. This, therefore, calls for the necessity of “sufficient reason” [44], which must be able to explain “why social welfare considerations should be considered decisive and why other considerations as those regarding the involuntary exposure of people to risks and harms are secondary and can be omitted completely” [41] (p. 96).

This emphasis on sufficient reason [44] for what can be considered an appropriate policy to bring about social justice has another important implication. It no longer allows for the application of the concept as if the distribution of some overarching good, such as “utility” or “welfare”, could resolve all dilemmas of distributive justice. This would require the commensuration of goods and bads and would allow compensating of one bad with another type of good. For example, adequate compensation could be considered to fully resolve justice dilemmas related to the unequal incidence of environmental degradation and hazards [41] (p. 96). Instead, separate spheres of justice should be defined, and the commensuration of goods and bads across all spheres of justice is not always acceptable. This requires constraints on compensation that enable utility maximization. In particular, protection of vital interests, such as basic needs, nutrition and shelter, health and safety, becomes a core element of social justice. Whether or not actors will be willing to agree on such difficult constructs of justice may depend on the choice of adequate procedures that provide the legitimacy of decisions. The concept of procedural justice “assures those whose interests are not endorsed by a particular environmental decision that the interest can count in other decisions” [41] (p. 96). The institutional design of social justice has to pay attention to some core questions, like: Which parties are included in the decision making process or whose interests will be taken into account? Are there enough reasons for such a policy to be justified? Or the question of which parties are allowed to participate, and in what way their participation is organized among others regarding their access to information and other resources. Furthermore, there is the question of what is the effective distribution of power among the participants who will be subjected to the outcome.

5.3. Transaction Costs and Opportunity Costs of Integration or Segregation by Institutions

Based on this extended framing of costs and benefits, we will now move to the impacts of ISI on the transaction and opportunity costs beginning with the physical perspective on transactions (as developed in Section 3). The performance of both types of institution causes transaction costs and opportunity costs. Both integration and segregation is associated with these two categories of costs. Transaction costs are the costs of information, coordination, negotiation, monitoring, *etc.*, associated with the processes of transactions and the interdependence between actors provoked by the transactions. Both integrating and segregating the effects of a transaction causes transaction costs. Integration causes transaction costs, for example when roundtables are organized to solve conflicts

between nature conservation and agriculture or for discussing agri-environmental programs to be adjusted to the local specificities of ecosystems and farm structures. Transaction costs of integration will increase when the demand for integration comes from institutions that require considerable efforts for implementation (see Figure 2). Equally, transaction costs of segregation arise, for example, when politicians have to produce plausible justifications for laws allowing excessive energy consumption associated with high greenhouse gas emissions. Transaction costs of segregation will increase the more segregation is admitted by the existing institutions, because this burdens the agents with unresolved conflicts (see Figure 2). These costs are not equal in all cases, but depend on the properties of the transactions and the interdependence of actors involved, as explained in Section 3.2 (see also [4]).

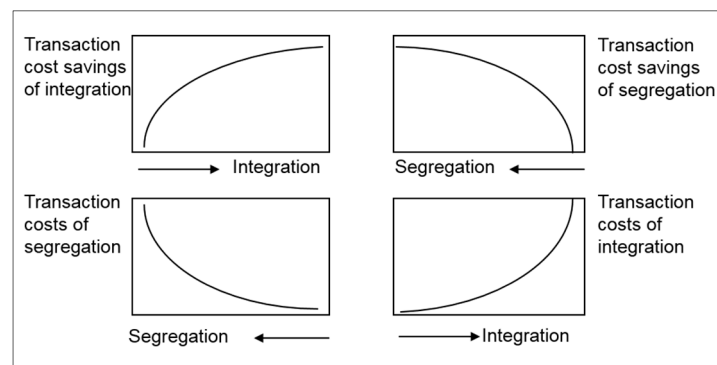


Figure 2. Transaction costs of integration and segregation.

Opportunity costs, on the other hand, are the benefits of transactions from additional integration (and less segregation) forgone if the sets of rules and governance structures are segregative (rather than integrative), and *vice versa*. As pointed out above, the degree of integration and segregation affects the benefits of transactions that accrue for the actors. These potential benefits have to be taken into account as opportunity costs. Benefits from integration that cannot be collected due to segregative institutional constraints can be losses in allocative efficiency, because incentive structures are distorted by incomplete liability. These benefits are opportunity costs of segregation. Benefits from segregation that may not materialize because of integrative institutional constraints may represent losses in dynamic efficiency, as complete liability can impede innovation and learning. These benefits are the opportunity costs of integration. Opportunity costs of integration will increase the more integration the existing institutions produce, and opportunity costs of segregation will also increase the more segregation the existing institutions allow (see Figure 3).

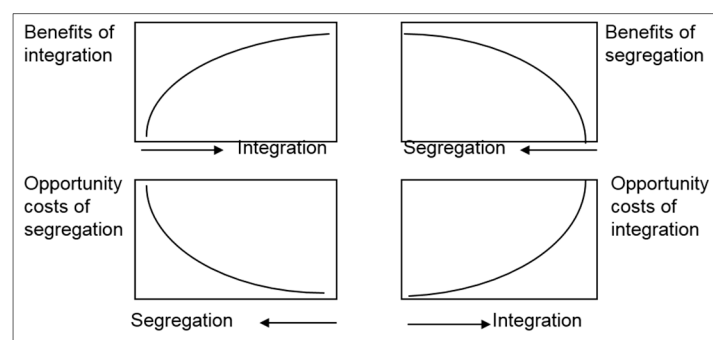


Figure 3. Opportunity costs of integration and segregation.

As the transaction and opportunity cost curves are similar, because both of them increase when the degree of integration or segregation grows, they can be easily aggregated. Up to now, we have only discussed the “demand” for integration and segregation as a “need” that has to be fulfilled in order to arrive at a desired allocation of the impact of transactions among actors. This is what the institutions are expected to achieve. The question now is how the “supply” of this “service” will be organized. As we discussed in Section 4.3 (and as shown in Table 3), the conflicts that arise from the interdependence between the actors affected by the impact of transactions can be regularized by institutions that, again, differ with regard to their integrative and segregative capacity, but now, considered from the social perspective. The costs relevant for the choice of ISI are transaction costs which have already been pointed out in Figure 2 as influenced by the physical properties of transactions. At the same time, they depend on the social organization of transactions and consist, to a large extent, of the costs of conflict regulation and consensus building. For reasons mentioned in Section 4.3, it is an empirical question that needs further clarification of whether or not the latter component of the transaction cost curves, for increasing or decreasing and integration, respectively, is more or less congruent with the cost curves shown in Figure 2 regarding the physical level. As there are at least some plausible arguments for this, we continue on the basis of this assumption, being well aware that this may be more diverse in reality.

5.4. Integrative-Segregative Trade-Offs at the Physical and Social Levels of Transactions

Figure 4 shows (based on Figures 3 and 4) how both the aggregated transaction costs and opportunity cost derived from the physical perspective and the social perspective on transactions relate to each other. Figure 5 also indicates how institutional choice can approach a point of low overall costs. “Congruency” indicates that integrative institutions prevail at the physical level, and “discrepancy” means that segregative institutions dominate here. “Congruency” reflects the property of integrative institutions to allow actors, who make decisions on transactions, not only to profit from beneficial effects, but also to hold them fully liable for adverse effects. They not only force them to internalize the transaction costs they cause, but also protect them against transaction cost resulting from the activities of other actors (see Table 1). “Discrepancy” reflects the property of force on actors who make decisions on transactions to refrain from receiving all gains from beneficial effects, but also allows them to shift some of the nuisances resulting from adverse effects to other actors. They may externalize transaction costs within limits, but can also not avoid bearing transaction costs caused by decisions made by others (see Table 2). Similarly, “unity and consensus” indicates that integrative institutions regularize the mode of decision making at the social level, and “bargaining and exchange” means that this is done by segregative institutions. “Unity and consensus” stands for the second column in Table 3 and “bargaining and exchange” for the third column in Table 3.

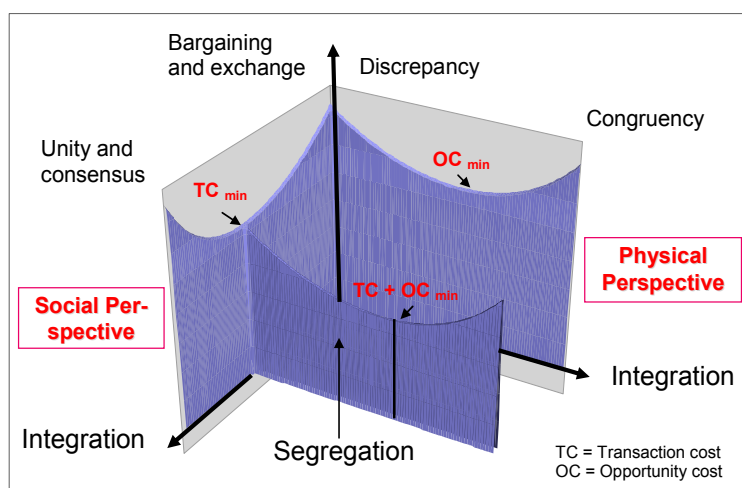


Figure 4. Transaction costs determined by the choice of integrative and segregative institutions at both the physical and the social levels.

5.5. Arriving at the Sustainability Area of Institutional Embedding

If we now start from the expectation that rules have to be agreed upon by the individuals participating in decision making, we also have to assume that those individuals want to avoid both the cost caused to them by integrative institutions and those resulting from segregative institutions. As shown in Figure 5, the costs of integrative institutions will increase, if more and more diverse effects of transactions are integrated in the decision making of the actor concerned, which at the same time causes increasing transaction costs for the implementation of the rules. Similarly, the cost of segregative institutions will be higher the more the effects of transactions are segregated and, thus, separated from the decision maker, which at the same time causes increasing transaction costs for coping with unresolved conflicts.

Figure 5 also shows that the total costs including both components tend to increase, if the integrative and segregative capacities of institutions are not balanced. Imagine that a new transaction takes place as a consequence of technological or biological innovation, like cultivating GMOs. This causes a variety of beneficial and adverse effects, blessings and nuisances, agreement between some actors and disagreement between others. At the beginning, this is strange to the social relationships, like a new organism entering an ecosystem. Then, a process of mutual adjustment and rearrangements takes place, associated with a search for knowledge about the new phenomenon and for options on how to respond to it. Existing sets of rules and modes of organization are adjusted or new ones are established to deal with “the new problem”; for example, liability rules and GMO-free zones. At the same time, the properties and processes associated with the good and its transaction may change to include technologies for protecting against the nuisances caused by the innovation. Provided that this process is successful, the new transaction and the associated interactions will be institutionally implanted into the relationships between the actors. This has to be considered as an important aspect of social systems, because the extent to which sets of rules and governance structures either expose an actor or isolates him from the effects of transactions is decided by this. Therefore, we call the costs caused by such a process the “costs of embedding in social construction”.

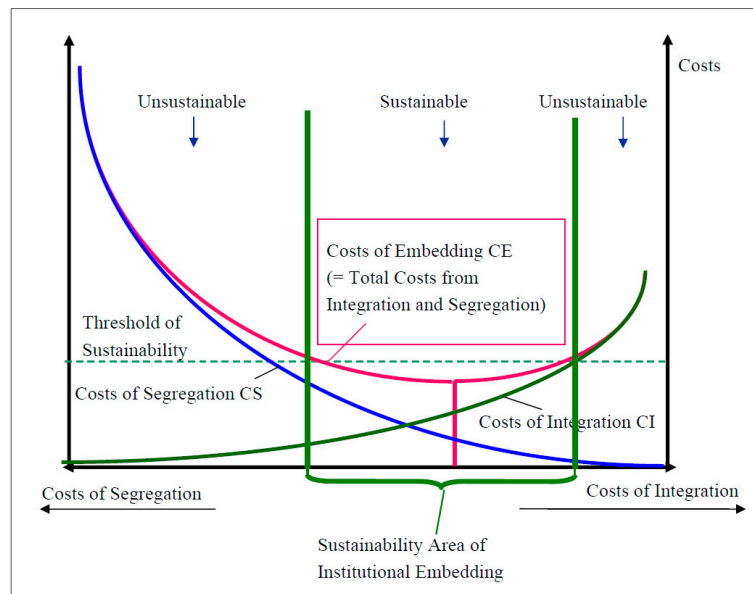


Figure 5. Embedding transactions in an integrative and segregative social construction.

The concept of social construction explains the emergence or design of nested systems of rules and associated forms of organizations that regularize transactions. Accordingly, embedding means here that transactions and interactions are regularized by elements of that system in order to govern the interdependence of the actors involved. This usage of the term “embedding” has a slightly different meaning in new institutional economics, where it refers, at least in the “four levels of social analysis” of Williamson [8], to long-term norms and traditions. It also differs from the understanding of embeddedness in sociology, as suggested by Granovetter [45], who focuses on how actors are embedded in social relationships that form networks. Institutional settings in which these costs of embedding are too high will not be sustainable. If there is a lack of integration (in other words, too much segregation), the social and ecological systems will suffer from excessive burdens resulting from non-integrated adverse effects and will lose their stability or even their capacity of resilience. If the existing sets of rules and governance structures demand too high a degree of integration (lack of segregation), society and the economy will lose their dynamic potential and will be unable to achieve the technological and social adjustments necessary to avoid frictions and crises. This may not only result in a decline of economic welfare, but also lead to a loss of stability and coherence in society. Similar consequences may arise if the sequencing of ISI that determines when they actually become effective during processes of production and provision and income generation and redistribution is inadequate. However, what “too high costs of embedding” actually means is an empirical question. This may eventually lead to a better understanding of the threshold of costs of embedding beyond which sustainability becomes unlikely (see Figure 5). The “sustainability area of institutional embedding” derived from that can be considered as a frame of reference for determining when institutions can be called integrative and when segregative.

6. Conclusions: A Regulative Idea for Crafting of Meta-Constitutional Rules

As it would often be too costly to establish sets of rules and governance structures specially adjusted to single transactions, families of similar (and possibly coherent) transactions should be

arranged that match with corresponding types of rules and organization. As the same holds for the characteristics of actors, the question is whether analogously designed families of actors would match with the designed families of transaction. Although it is neither feasible nor reasonable to separate actors and the transactions they undertake, they may belong to “families” that are not congruent in terms of their institutional fit. If both sorts of families do not show the same institutional fit, they would, in an isolated view, call for different institutions and governance structures. As a consequence, incompatibilities may have to be overcome by adequate compromises and combinations of, possibly complementary, types and elements of institutions and governance structures and by inventing new solutions. Provided that sufficient information about the various bundles of beneficial and adverse effects of the transactions could be obtained, we might be able to identify the Costs of integration (CI) and Costs of Segregation (CS) as pointed out in Figure 5. As this would deliver information on the total Costs of Embedding (CE), discourses and conclusions regarding the sustainability area of institutional embedding would be facilitated. If also families of transactions and families of actors with similar costs could be identified, the process of institutional choice could be arranged according to the following heuristic:

- (1) Select those families of transactions and families of actors where the integrative-segregative dimension is likely to be relevant.
- (2) Identify and discuss CI and CS and compare the CEs with the sustainability threshold.
- (3) Choose from existing or craft new rules that balance the cost and benefits of integration and segregation in a way so that total costs comply with the sustainability threshold.

This view of the IoS framework resembles that of Homann [46] (p. 37), who describes sustainability as being a regulative idea. The normative content of that regulative idea is that by solving concrete problems, transformed incentive structures provoke sustainability-oriented behavior. What Homann calls a “regulative idea” is similar to the “meta-constitutional rules”, which represents basic elements in the IAD framework developed by Ostrom [1]. Such meta-constitutional rules influence the design or emergence of constitutional, collective choice and operational rules and the corresponding governance structures closely interrelated with institutions. Such an impact of sustainability as a regulative idea, however, can hardly be expected as long as it remains an abstract term. To make it practical and applicable to concrete problems, we can make use of the notion explained above that sustainability can be interpreted as balancing and sequencing the integrative and segregative impacts of institutions and governance structures. In this way, the regulative idea “sustainability” may become an applicable meta-constitutional rule.

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Conflicts of Interest

The author declares no conflict of interest.

References and Notes

1. Ostrom, E. *Understanding Institutional Diversity*; Princeton University Press: Princeton, NJ, USA, 2005.
2. McGinnis, M. Polycentricity and the core of governance. In Proceedings of the Preliminary draft Prepared for the Discussion in Political Science Y673 Seminar, Vincent and Elinor Ostrom Workshop at Indiana University, Bloomington, IN, USA, 20 March 2002.
3. Ostrom, E. *Governing the Commons: The Evolution of Institutions for Collective Action*; Cambridge University Press: New York, NY, USA, 1990.
4. Hagedorn, K.; Arzt, K.; Peters, U. Institutional arrangements for environmental co-operatives: A conceptual framework. In *Environmental Co-Operation and Institutional Change*; Hagedorn, K., Ed.; Edward Elgar: Cheltenham, UK; Northampton, MA, USA, 2002; pp. 3–25.
5. Hagedorn, K. Particular requirements for institutional analysis in nature-related sectors. *Eur. Rev. Agric. Econ.* **2008**, *35*, 357–384.
6. North, D.C. *Institutions, Institutional Change and Economic Performance*; Cambridge University Press: New York, NY, USA, 1990.
7. Bromley, D.W. *Economic Interests and Institutions: The Conceptual Foundations of Public Policy*; Basil Blackwell: Oxford, UK, 1989.
8. Williamson, O.E. The new institutional economics: Taking stock, looking ahead. *J. Econ. Lit.* **2000**, *38*, 595–613.
9. Morand, F.; Barzmann, M. Integrating Institutions for Sustainable Development: “Green Speak” and Beyond. IDARI Working Paper, Humboldt University Berlin, Berlin, Germany, 2005.
10. Ostrom, E. The institutional analysis and development approach. In *Designing Institutions for Environmental and Resource Management*; Loehman, E.T., Kilgour, D.M., Eds.; Edward Elgar: Cheltenham, UK; Northampton, MA, USA, 1998; pp. 68–90.
11. Kiser, L.L.; Ostrom, E. The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches. In *Polycentric Games and Institutions*; University of Michigan Press: Ann Arbor, MI, USA, 2000; pp. 56–88.
12. Perman, R.; Ma, Y.; McGilvray, J.; Common, M. *Natural Resource and Environmental Economics*; Longman: London, UK, 1999. Sustainability is not a concept that merely relates to issues arising from the use of natural resources and eco-logical systems. Just for the purpose of this paper, I will only refer to this area of application where sustainability plays a prominent role. For an overview of this issue area, see [12].
13. Scharpf, F.W. Games real actors could play: Positive and negative coordination in embedded negotiations. *J. Theor. Polit.* **1994**, *6*, 27–53.
14. Schmid, A.A. *Conflict and Cooperation: Institutional and Behavioral Economics*; Blackwell: Oxford, UK, 2008.
15. Paavola, J.; Adger, W.N. Institutional ecological economics. *Ecol. Econ.* **2005**, *53*, 353–368.
16. Jupille, J.; Caporaso, J.A.; Checkel, J.T. Integrating institutions rationalism, constructivism, and the study of the European Union. *Comp. Polit. Stud.* **2003**, *36*, 7–40.
17. Jupille, J.; Caporaso, J.A.; Checkel, J. Integrating institutions: Theory, method, and the study of the European Union. *Comp. Polit. Stud.* **2003**, *36*, 7–41.

18. Kreppel, A.; Tsebelis, G. Coalition formation in the European parliament. *Comp. Polit. Stud.* **1999**, *32*, 933–966.
19. Boulding, K.E. *Beyond Economics: Essays on Society, Religion, and Ethics*; University of Michigan Press: Ann Arbor, MI, USA, 1970.
20. Boulding, K.E. *The Economy of Love and Fear: A Preface to Grants Economics*; Wadsworth Publishing: Belmont, CA, USA, 1973.
21. Boulding, K.E. Economics as a moral science. *Am. Econ. Rev.* **1969**, *59*, 1–12.
22. Parsons, T. *The Structure of Social Action*; Free Press: New York, NY, USA, 1949.
23. Parsons, T. *Social System*; Routledge: New York, NY, USA, 1951.
24. Parsons, T. *Sociological Theory and Modern Society*; Free Press: New York, NY, USA, 1967.
25. Seibel, H.D. Social deviance in comparative perspective. In *Theoretical Perspectives on Deviance*; Scott, R.A., Douglas, J.D., Eds.; Basic books: New York, NY, USA; London, UK, 1972; pp. 251–281.
26. Tonoyan, V. Entrepreneurship and corruption: Integrating institutions, rationality and social norms. In *Proceeding of the Symposium: Re/Constructing Corruption: Towards an Interdisciplinary Framework*, Norwich, UK, 30 April–2 May 2003.
27. Lijphart, A. *Democracy in Plural Societies: A Comparative Exploration*; Yale University Press: New Haven, CT, USA, 1977.
28. Horowitz, D.L. *Ethnic Groups in Conflict*; University of California Press: Oakland, CA, USA, 1985.
29. Caspersen, N. Good fences make good neighbours? A comparison of conflict-regulation strategies in postwar Bosnia. *J. Peace Res.* **2004**, *41*, 569–588.
30. Premdas, R.R. Public Policy and Ethnic Conflict. Management of Social Transformations (MOST), 1997. Available online: <http://www.unesco.org/most/premdas.htm> (accessed on 21 November 2014).
31. Olsen, J.P.; March, J.G. *Rediscovering Institutions: The Organizational Basis of Politics*; Free Press: New York, NY, USA, 1989.
32. Bogason, P. Local democratic governance: Allocative, integrative or deliberative? In *Tampering with Tradition: The Unrealized Authority of Democratic Agency*; Bogason, P., Kensen, S., Miller, H.T., Eds.; Lexington Books: Lanham, MD, USA, 2004; pp. 23–39.
33. Bogason, P. Institutional Theory and Democracy. Working Paper 2004: 7, Centre for Democratic Network Governance, Roskilde University, Roskilde, Denmark, December 2004.
34. Skogstad, G. Legitimacy and/or policy effectiveness? Network governance and GMO regulation in the European Union. *J. Eur. Publ. Pol.* **2003**, *10*, 321–338.
35. Young, O.R. *The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale*; MIT Press: Boston, MA, USA, 2002.
36. Bromley, D.W. *Environment and Economy: Property Rights and Public Policy*; Basil Blackwell Ltd.: Oxford, UK, 1991.
37. Demsetz, H. Toward a theory of property rights. *Am. Econ. Rev.* **1967**, *57*, 347–359.
38. Daly, H.E. Toward some operational principles of sustainable development. *Ecol. Econ.* **1990**, *2*, 1–6.
39. Coase, R.H. The problem of social cost. *J. Law Econ.* **1960**, *3*, 1–44.
40. Pigou, A.C. *The Economics of Welfare*; McMillan&Co.: London, UK, 1932.

41. Paavola, J. Institutions and environmental governance: A reconceptualization. *Ecol. Econ.* **2007**, *63*, 93–103.
42. Vatn, A. Rationality, institutions and environmental policy. *Ecol. Econ.* **2005**, *55*, 203–217.
43. Paavola, J. Interdependence, pluralism and globalisation. In *Environmental Values in a Globalizing World: Nature, Justice and Governance*; Lowe, I., Paavola, J., Eds.; Routledge: New York, NY, USA, 2004.
44. Bromley, D.W. *Sufficient Reason: Volitional Pragmatism and the Meaning of Economic Institutions*; Princeton University Press: Princeton, NJ, USA, 2006.
45. Granovetter, M. Economic action and social structure: The problem of embeddedness. *Am. J. Econ. Sociol.* **1985**, *91*, 481–510.
46. Homann, K. Sustainability: Politikvorgabe oder regulative Idee. In *Ordnungspolitische Grundfragen einer Politik der Nachhaltigkeit*; Gerken, L., Ed.; Nomos: Baden-Baden, Germany, 1996; pp. 33–47.

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