

**INSTITUTIONAL LINKAGES, TRANSACTION COSTS, AND  
WATER INSTITUTIONAL REFORMS:  
ANALYTICAL APPROACHES AND CROSS-COUNTRY EVIDENCES**

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**Abstract**

*This chapter is essentially an attempt to explain the anomaly of why institutional changes are not occurring even when the opportunity costs of status quo exceed well the transactions costs of these changes. While usual explanation relies on political economy arguments, this chapter shows the importance of the transaction cost implications of the institutional linkages that originate actually from the internal features and the external environment of institutions. This chapter has theoretically explained the origin of institutional linkages and described their implications for reform design and implementation principles. It has also analytically demonstrated these linkages with the application of the Institutional Analysis and Development framework to water institutions. By incorporating the transaction cost and political economy implications of institutional linkages, the chapter has also outlined a generalized transaction cost framework. Anecdotal and case study-based evidences are, then, provided to illustrate how institutional linkages are used in deriving and applying reform design and implementation principles such as institutional prioritization, sequencing, and packaging as well as reform timing and scale. Based on the discussion of the analytical approaches and practical illustrations, the chapter concludes by identifying implications for theory and policy in the realm of institutional reform.*

**Keywords:** Water Reform, Institutional Structure, Institutional Environment, Institutional Linkages, Reform Design, Reform Implementation, Transaction Cost, Political Economy, India, Mexico.

## **1. INTRODUCTION**

Although countries differ in terms of the nature and severity of their water problems, one aspect common to most of them is that their water problems originate more from use inefficiency and poor management than from the physical limits for supply augmentation. This diagnosis, in fact, prescribes a radical reform in water institutions. Unfortunately, undertaking such a reform is not

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an easy task, as water institutions in most countries are dated and deeply rooted. Even though the opportunity costs of 'status quo' are increasing fast to exceed the transaction costs of institutional reform, the political economy constraints continue to remain a powerful obstacle for change. This implies two interrelated points with considerable theoretical and policy implications. First, the conventional transaction cost calculus is not providing us with the full explanation. Second, a deeper understanding of institutions and their change process is needed to derive institutional design principles that can neutralize some of the political economy obstacles to reform.

North (1990a and 1990b) has indeed generalized the original formulation of Coase (1937) and Williamson (1975 and 1985) in terms of his institutional transaction cost approach that explicitly incorporates political transaction costs. Further generalization of the theory is needed to account for the transaction cost implications of the internal features and change dynamics of institutions. These transaction cost implications emerge from the linkages that are evident within institutions as well as those exist between institutions and their social, economic, and political environment. An understanding of these linkages is immensely useful for deriving institutional design and implementation principles such as institutional prioritization, sequencing, and packaging as well as reform timing and scale. These principles can minimize the cost of transacting institutional reform in a given political economy context and overcome the usual inertia associated with the stupendous nature of the reform task. It is this theoretical and policy context that sets the stage and provide the motivation for this chapter.

Our objectives in this chapter are to outline the analytical approaches for understanding institutional linkages, to incorporate their implications within a generalized transaction cost framework, and to provide anecdotal evidences for institutional linkages from cross-country experiences and case study-based discussion on the role of institutional transaction costs and political economy factors with several country-specific experiences. The chapter is organized as follows: first, the main features of institutions are discussed to provide the basis for developing the 'institutional ecology principle' that underpins the 'institutional decomposition and analysis' (IDA) framework (Saleth and Dinar, 2003). The IDA framework is used to analytically decompose water institutions and graphically demonstrate the linkages evident among these institutions as well as between them and the institutional environment. The implications of these linkages are then incorporated within a generalized transaction cost framework. After these analytical and methodological sections, anecdotal and case study-based evidences are provided for the institutional linkages and their transaction cost and political economy implications. Finally, the chapter concludes by identifying implications for theory and policy in the realm of institutional reform in general and water institutional reform in particular.

## **2. INSTITUTIONAL FEATURES AND THEIR LARGER IMPLICATIONS**

Let us start first with a very brief discussion on what are institutions and what purpose they serve in society. Institutions are closely linked with knowledge and information, which are coded and embodied in the form of simple 'rules' to a more complex 'rule configurations or structure'. Their purpose is to guide the 'going concerns' or to achieve the 'human purposes'. Institutions, as rules, not only define the action situations and action sets but also provide incentives, govern behaviors, and determine outcomes both in individual and collective decision-making

(Commons, 1968; Bromley, 1989; North, 1990a; Ostrom, 1990). From a larger perspective, institutions also shape the world vision and the very identity of the actors themselves (Granovetter, 1985; March and Olsen, 1989; North, 1990a).

## 2.1. Features of Institutions

For demonstrating institutional linkages and their implications for institutional change and transaction costs, we concentrate on five key features of institutions. First, institutions are subjective in terms of origin and operation but objective in terms of their manifestations and impacts.<sup>1</sup> Second, institutions are path-dependent. Path-dependency means that history does matter and hence, the present status and future direction of institutional evolution cannot be divorced from its earlier course or past history.<sup>2</sup> Third, institutions also have stability and durability properties.<sup>3</sup> Fourth, institutions are hierarchic and nested. Institutions are not a single entity but comprise of a number of fundamentally linked and structurally embedded components. Since these components assume the form of either a single rule or a subset of sequentially nested rules, institutions can be viewed as a constellation of hierarchically nested rules (see North, 1990a: 83; Ostrom, 1999: 38).<sup>4</sup> Fifth, the nested character of institutions also implies their embeddedness and complementarity not only to each other but also with the institutional environment as defined by the cultural, social, economic, and political milieu within which the institutions evolve and operate (North, 1990a: 22).<sup>5</sup>

## 2.2. Implications for Institutional Change and Transaction Costs

The features of institutions noted above are well known, as are some of their implications, for the nature of the institutional change process itself. Since the theoretical, methodological, and empirical implications of the subjective nature of institutions have received our detailed

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<sup>1</sup> The subjective nature of institutions is recognized by treating them as 'belief system' (Veblen, 1919: 239), 'behavioral habits' (Commons, 1934: 69), 'mental construct' or the 'subjective model' of individuals (North, 1990a), and 'artifacts' that think and act through the medium of human beings (Douglas, 1986; Stein, 1997; Ostrom, 1999). Hodgson (1998: 181) views institutions as "both 'subjective ideas' in the heads of the agents and 'objective' structures faced by them".

<sup>2</sup> The sources of path dependency include the slowly changing informal institutions as well as other self-reinforcing mechanisms such as network externalities, learning effects, and the historically derived subjective modeling of issues (North, 1990a: 44).

<sup>3</sup> In this respect, it is necessary to recognize two key points. First, the stability and durability features, as discussed here, are free of efficiency considerations. And, second, these features do not preclude either the malleability or adaptive flexibility of institutions (Adelman, et al., 1992: 106) or the institutional variety and diversity at the micro level (Hodgson, 1998: 171).

<sup>4</sup> Besides hierarchical linkages, institutional arrangements also exhibit spatial nestedness as illustrated by the spatial features of markets, hierarchies, and alliances (Boyer and Hollingsworth, 1997a: 469-477)

<sup>5</sup> There are also contextual and spatial dimensions to institutional embeddedness. It is in view of these dimensions that markets and their institutional substitutes such as hierarchies, networks, and alliances are constantly influenced by socio-economic transformation, technical change, and changing status of regions and nation-states (Boyer and Hollingsworth, 1997b: 54).

treatment elsewhere (see Saleth and Dinar, 2003), here, we consider the implications of the remaining features. As to the nature of institutional change, path-dependence implies, in fact, the limited scope for sudden and radical changes.<sup>6</sup> Institutional change is, therefore, mostly gradual and continuous. The incremental attributes of institutional changes are also an outcome of the relative stability and durability features of institutions (North, 1990a: 89). The hierarchic and nested character of institutions suggests that change in one institutional component is difficult without concurrent changes also in other institutional components as well as in the institutional environment itself. Similarly, the internal embeddedness and complementarity of institutions suggest clearly that it is impractical to consider a particular institutional form either as superior or as universally valid.<sup>7</sup>

From the perspective of transaction costs, institutional change is resisted and inefficient institutions persist not only because of the rent-seeking behavior of the politically powerful groups (North, 1990a:7-8) and the failure of the ‘remediableness criterion’ (Williamson, 1999)<sup>8</sup> but also due to certain internal technical features of institutions themselves. These technical aspects include path-dependency, network externalities, learning effects, and institutional nestedness and complementarity. Notably, the transaction cost and performance implications of these technical aspects are well recognized in the literature. For instance, since path-dependency and other self-reinforcing mechanisms tend to reinforce the current course of development path, it becomes extremely difficult or very costly to reverse the course of the ongoing path (North, 1990a: 99). The fact that institutional components are nested in a hierarchic structure also implies that the components at each level are more costly to change than the previous ones (North, 1997: 6). Similarly, the fact that the formal institutions are embedded within other formal and informal institutions not only minimizes their collective transaction costs but also enhances their mutual performance.<sup>9</sup>

### 2.3. Analytical and Methodological Implications

While the implications of institutional features discussed above are well known, there are others with far reaching analytical and methodological importance that are either less known or not

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<sup>6</sup> Nevertheless, sudden institutional changes, especially through conquest and revolution are possible. However, these changes can affect only the formal/macro level rules. In contrast, the informal/micro level rules, which change far slowly than their formal/macro counterparts, usually linker on with little change (North, 1990a: 6).

<sup>7</sup> What is needed, therefore, is an ideal combination of institutional mechanisms (e.g., state, market, hierarchies, and other non-market forms) that support and complement each other to improve their mutual and collective efficiency (Boyer and Hollingsworth, 1997b: 51-53).

<sup>8</sup> This criterion means the absence of superior and feasible alternatives (Williamson, 1999: 316). To him, the mere survival of some institutions within a comparative institutional competition can be taken as a “rough-and-ready test” for this criterion. However, the survival of certain extant modes, for example the QWERTY keyboard, is not due to this criterion but due to the exorbitant cost of switching to more efficient alternatives. With such costs, it is not reasonable to compare existing institutions with new alternatives (Williamson 1999: 316).

<sup>9</sup> For instance, modern capitalistic institutions are embedded within a system of trust, reciprocity, tacit or shared knowledge, and risk sharing arrangements (Boyer and Hollingsworth, 1997a: 445-447). Market institutions are also embedded within the social and political institutions both at national and regional levels (Lazonick, 1991).

recognized so far. Let us focus here on two of these implications. First, as we take a closer look at the implications of the technical features of institutions, it becomes apparent that they are nothing but different forms of institutional linkages. For instance, path dependency relates to institutional linkages in a temporal context. Similarly, the hierarchic, nested, and embedded features of institutions are actually the institutional linkages in a structural sense. Although the transaction cost implications of these institutional linkages are recognized, they have not been formally incorporated as part of the transaction cost framework. This chapter will fill this gap by explicitly incorporating the role of institutional linkages within a generalized institutional transaction cost framework that includes also the non-economic factors including the political economy constraints. Besides an analytical demonstration of institutional linkages in the specific context of water institutions, this chapter will also provide anecdotal evidences for institutional linkages and case studies for demonstrating the role of political economy and transaction cost approaches to water institutional reforms in selected countries.

The second implication relates to the similarity between the institutional system and an eco-system.<sup>10</sup> This commonality allows us to propose what we call as the *institutional ecology principle* (Saleth and Dinar, 2003). While this principle may seem to be trivial and superficial, it has very powerful implications. For instance, it allows us to present most of the institutional features as a single idea. It also enables us to conceptualize institutions in a form that is easily comprehensible in popular and political levels. This principle also has the ability to resolve the evolutionary vs. equilibrium conflict persisting in institutional economics.<sup>11</sup> Finally, but more importantly, the institutional ecology principle also provides the conceptual basis for developing the IDA framework (Saleth and Dinar, 2003). It is this framework that we are going to use in the next section to analytically decompose water institutions and demonstrate, thereby, the functional and operation linkages within water institutions and their linkages, in turn, with their institutional environment.

### 3. INSTITUTIONAL LINKAGES IN THE CASE OF WATER INSTITUTIONS

For demonstrating institutional linkages, first, institutions are to be decomposed. In the literature, institutional decompositions have attempted at different levels, contexts and details.<sup>12</sup>

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<sup>10</sup> One question that is immediate here is: do institutions have life like an ecosystem? The stability, durability, and path dependency features of institutions ensure their endurance far beyond the lifetime of their creators. Even institutions no longer used for the purposes for which they were originally designed are often revived later in different contexts. For instance, the Torrens property title registration system that dramatically simplified and improved land dealings around the world is based on a 19th century system used for ship registration in Germany. Similarly, the limited liability share company, the organizational concept that has revolutionized modern commerce, has evolved from the British Companies Act of 1862 (Young and McColl, 2002).

<sup>11</sup> Even though institutions evince constant changes just as a natural ecosystem, they can be in periodic but brief equilibrium specifically because their changes are so slow and marginal over a long time span. Thus, evolution and equilibrium—being part of the same process—do not exclude each other. The relative relevance of the two depends on the length of the timeframe being considered for institutional analysis. From a historical or teleological perspective, an evolutionary approach can be relevant. But, when the timeframe is short where the evolutionary changes are so slow as to be almost stable, then, an equilibrium approach is indicated.

<sup>12</sup> For a detailed review of these attempts, see Saleth and Dinar (2003: Chapter 4).

The IDA framework is one of these attempts that can be applicable essentially in the context of formal and macro level institutions. The IDA framework involves a three-stage decomposition of water institutions and its institutional environment. First, water institutional structure is distinguished from its institutional environment (Saleth and Dinar, 1999 and 2003). The water institutional environment is characterized by the social, economic, political, and resource-related factors that influence water sector and water institutions. The water institutional structure is defined interactively by the legal, policy, and organizational rules.<sup>13</sup> Second, the water institutional structure is decomposed to highlights its three *institutional components*, i.e., water law, water policy, and water administration (or, water-related organizations).<sup>14</sup> And, finally, each of these three institutional components can also be decomposed further to highlight some of their major and policy-wise relevant *institutional aspects*.

As to the institutional aspects, water law, for instance, can be decomposed to highlight: (a) legal links among water sources, (b) legal linkages between land, water, and environment resources, (c) water rights, (d) conflict resolution, (e) accountability, and (f) legal scope for private sector participation. Similarly, water policy can be decomposed to identify: (a) use priority, (b) project selection criteria, (c) cost recovery, (d) inter-regional and inter-sectoral water transfer policies, (e) policy for decentralization and privatization, and (f) technology policy. Likewise, the organizational dimension of water institution can be decomposed to signify: (a) government layers affecting water sector, (b) organizational structure of water administration, (c) financing and staffing pattern (d) pricing/fee collection organs, (e) regulatory/accountability mechanisms, and (f) information/technological capabilities. Although the IDA framework stops decomposition at the stage of institutional aspects, let us note that these institutional aspects can be decomposed further to identify the *rules* or *rule configurations* underlying each of them.

### 3.1. Institutional Linkages

The overall performance of water institutions and their ultimate impact on water sector performance depends not only on the capabilities of its individual components and aspects but also on the degree of integration evident among them. The extent of integration within water institutions can be formalized in terms of the strength of institutional linkages. An illustrative set of these institutional linkages are depicted in Figure 1. To begin with, the way water sources as well as their relationship with land and environmental resources are treated within water law can influence water policy aspects such as priority setting for water uses and project-selection criteria. For instance, a water law that does not differentiate water by its source but recognizes the ecological linkages between water and other resources is more likely to encourage a water policy that assigns a higher priority to environmental imperatives and hydrological interconnectivity in project selection. Such a legal-policy linkage also creates a favorable

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<sup>13</sup> The concepts of 'institutional structure' and 'institutional environment' as used here are different from those of Williamson (1975) and North (1990a). For instance, they use institutional structure to include only the political and economic organizations and institutional environment to include the legal and policy aspects. In the case of water institutions, such conceptions are not germane and relevant.

<sup>14</sup> Intuitively speaking, water law and water policy form the software component of water institutions and water administration or organization constitutes their hardware component.

institutional environment for promoting an integrated approach to water resource management. This particular linkage also indicates the way in which water law and water policy are influenced by the laws and policies related to other resources like land and environment.

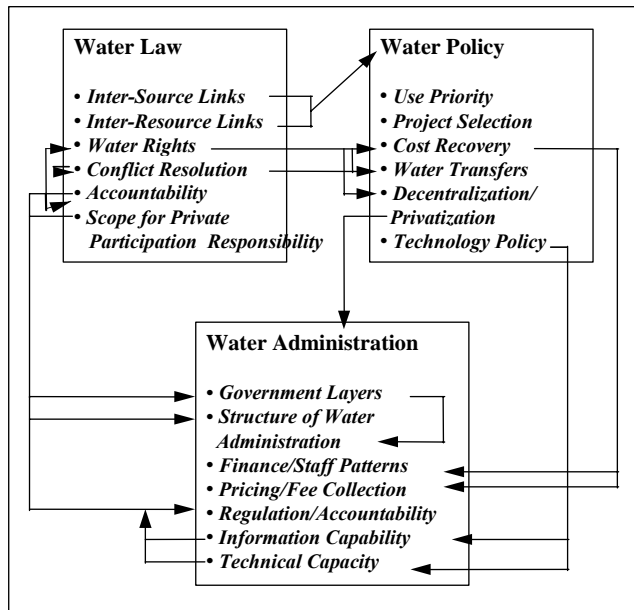


Figure 1

**Institutional Linkages within Water Institutions**

The most important legal aspect, one with multiple linkages to other legal, policy, and administrative aspects, is related to water use rights. It reinforces the linkages between the two legal aspects: conflict resolution and accountability. It also influences water policy through its linkages—both implicit and explicit—with policy aspects such as water pricing, cost recovery, management decentralization, and private sector participation. The three legal aspects, i.e., water rights, conflict resolution, and accountability, also have strong linkages with water administration in so far as they require special administrative mechanisms and technical/functional capabilities. Similarly, different policy aspects also strongly influence water administration. The most important among them are the policy aspects pertaining to user participation, management decentralization, and private sector participation. These policy aspects can strengthen water administration by tapping private skills and funds while contributing to the process of decentralization and debureaucratization. Policy aspects related to the application of water, information, and management technologies contribute to infrastructural development, skill formation, and capacity building.



### 3.2. Exogenous Influence

Since the interaction between water institutions and water sector occurs within an environment characterized by many factors outside their strict boundaries, institutional linkages and their performance implications are also subject to exogenous and contextual influences. The roles these exogenous factors play in the institution-performance interaction within water sector are illustrated in Figure 2. For analytical convenience and simplicity, Figure 2 focuses only on the most important factors and their influence on the process of the institution-performance interaction.

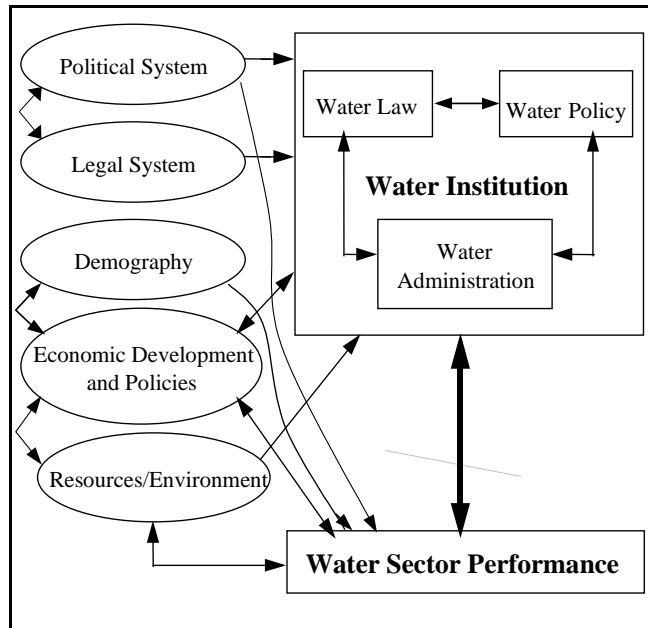


Figure 2

#### Exogenous Influence on Institution-Performance interaction

While institutions do influence water sector performance through the economic medium, both the nature of water sector and its performance can influence water institutions through the hydro-geological and political mediums. This two-way linkage has several important implications. First, it indicates the obvious role that economic factors play in initiating institutional changes in the water sector. Second, it also shows how hydrogeological factors can explain institutional variations across countries and regions. Since water institutions are shaped by the nature of water sector, they are not entirely independent of the basic characteristics of the water sector itself. Thus, water institutions in areas with abundant water can differ from those in areas with acute scarcity. And, third, the two-way linkage between water institution and water sector performance also indicates the way crisis in the water sector can build political pressure

for institutional change. The crisis-induced institutional responses being observed in many countries around the world (Saleth and Dinar 1999 and 2000) provide ample evidence for this phenomenon.

The political impact of the hydrological phenomenon of water crisis also has an underlying economic urge for change. With a crisis-ridden water sector, the marginal benefits of institutional change in terms of improved performance become very high relative to both the real and monetary costs of transacting the institutional change. Although the incremental net benefits from institutional change can decline as water institutions mature, they are high in the initial stages of institutional evolution. This is mainly from an economic perspective. However, the calculus can change once political economy aspects are taken into account, as the evaluation of the benefits and costs of institutional change is often blurred by political considerations. Since political expediency often involves myopic considerations, the transaction costs—both real and monetary—are overestimated while the benefits streams, which continues over a longer time span and spills over far beyond the water sector, are underestimated. When a water crisis assumes serious proportions (e.g., during worst drought), causing popular concerns, the economic calculus attains the much-needed political legitimacy and urgency.

The context within which the institution-performance interaction occurs is as important as the mechanics of the interaction itself because of its conditioning effect on the two-way linkages between the water institution and water sector performance. Although institutional differences provide the major explanation for variations in water sector performance, the general context of the institution-performance interaction is still important for providing residual and complementary explanations. In many instances, the context can even explain better the reasons why similarly placed water institutions (or their components) lead to a differential water sector performance. The economic factors (e.g., macro economic reforms and trade policy changes) and environmental factors (e.g., droughts, floods, catchment loss, and salinity) also play a strong role in providing impetus for water institutional changes. These cases indicate the powerful effects of the exogenous factors on institutional linkages and their performance impacts.

#### **4. GENERALIZED INSTITUTIONAL TRANSACTION COST FRAMEWORK**

Although the transaction cost approach was originally developed in an exclusively economic and apolitical context, North (1990a and 1990b) has made a major amendment that incorporates the real costs associated with many non-economic and non-market aspects. His institutional transaction cost framework can, therefore, capture the individual and interactive effects of both economic and non-economic factors within a common analytical framework. Let us begin first by interpreting this framework in the particular context of water institutions. While the factors influencing water institutions are many with a diverse origin and varying impact, for analytical convenience, they can be grouped into endogenous factors that are internal to water sector and exogenous factors that are outside the strict confines of both water institution and water sector.

The endogenous factors include water scarcity, water conflicts, financial and physical deterioration of water infrastructure, and operational inefficiency of water institutions. The exogenous factors include economic development, demographic growth, technical progress, economic and political reforms, international commitments, social values and ethos, and natural

disasters such as floods and droughts. Since the exogenous and endogenous factors are interrelated and their relative impacts differ by context, it is difficult either to isolate their individual roles or to generalize the direction of their effects. But, their effects can be tracked within the institutional transaction cost framework by conceptualizing them as part of either the transaction costs or the opportunity costs of institutional change. In the context of water institutions, the transaction costs cover both the real and monetary costs of altering the regulatory, monitoring, and enforcement mechanisms related to water development, allocation, and management. Similarly, the opportunity costs cover both the real and economic value of opportunities foregone, which, in fact, represents the net social costs of '*status quo*'.

The opportunity and transactions costs of institutional changes are not static but change continuously due to the effects of factors both endogenous and exogenous to water sector and water institutions. The effects of some of these factors manifest in economic forms and, therefore, can be quantified or approximated in economic terms. For instance, as water scarcity becomes acute due to economic development and population growth, the real and economic costs of inappropriate water institutions tend to rise creating, thereby, both an economic and political urge for change. However, the effects of other factors (i.e., those related to political economy and institutional linkages) are largely strategic in nature and hence, may not be neatly quantified in monetary terms. Nevertheless, the opportunity and transaction cost effects of these factors are real and significant. For instance, economic reforms magnify the fiscal implications whereas natural calamities such as droughts and floods aggravate the political implications of the opportunity costs of inappropriate institutions. Similarly, political reforms involving nation-wide institutional changes, on the other hand, reduce the transaction costs of water sector reforms directly because the institutional changes within water sector form only a small part of the overall reform process. Likewise, technical progress (e.g., satellite and information technologies and computer-based water control structures) can also reduce the transaction costs of institutional changes. As these exogenous factors tend to magnify the opportunity costs of water crisis and reduce the transaction costs of water sector reforms, they often provide a powerful economic urge and political thrust for institutional changes within water sector.

Since the factors endogenous to water institutions such as the institutional linkages also play a powerful role in influencing the nature, direction, and speed of the reform process, their exclusion can underestimate the true potential for institutional change. Institutional change is not a one-time event, but rather a continuum that moves in line with the changing resource realities, socio-economic needs, and political power structure. As the reforms initiated in the early stages brighten the prospects for downstream reforms, there are intricate and functional linkages between the opportunity costs of earlier reforms and the transaction costs of subsequent reforms. For instance, with the institution of transferable water rights, the prospects for other institutional aspects such as conflict resolution and water markets increase due to the linkages that the transaction costs of the latter two institutional aspects have with those of the water rights system. There are also scale economies in transaction costs in the sense that the cost of transacting water institutional changes is lower when water sector reform forms part of an overall country-wide economic and political reform than otherwise. It also shows how institutional changes within water sector are linked with similar changes elsewhere in society.

Similarly, there is also a vast scope for minimizing transaction cost with alternative sequencing and appropriate packaging of reform components. For instance, there are fundamental linkages among institutional aspects such as water rights and cost recovery, privatization/corporatization and water pricing, and farm policies and water policies. Such linkages can be exploited for reform sequencing (e.g., reform in urban sector followed by reform in irrigation sector or management turn-over followed by cost recovery policy or water rights) and packaging (e.g., combining water sector reforms with overall/sub-sectoral reform process). Likewise, the changes in the overall institutional environment (e.g., macro economic reform, political reconstruction, droughts/floods, or international/bilateral agreements) can be exploited with appropriate timing and scale of institutional reform programs.

Interestingly, besides their implications for economic and technical transaction costs, the reform design and implementation principles also have strategic roles in relaxing political economy constraints. For instance, institutional sequencing (e.g., undertaking first the politically easier reforms), though appear to bypass the political economy constraints, actually tackles them by gradually weakening the groups opposing reforms while concurrently strengthening the pro-reform groups. Similarly, institutional packaging (e.g., combining reform options favoring different groups) can also help in building pro-reform political coalitions. Thus, the generalized transaction framework, as outlined here, captures not only the role of factors both within and outside the water sector but also the strategic significance of certain dynamic aspects of the process of institutional change itself. Since this framework provides a unified approach to track and account for the effects of various factors affecting institutional change, it can provide a better explanation for both country-specific as well as cross-country variations in the nature and direction of water institutional changes.

## **5. ANECDOTAL EVIDENCES AND CASE STUDIES**

Let us now provide some practical instances to fix the points evident or implied in the previous sections. While some anecdotal evidences are provided to show institutional linkages and their political economy and transaction cost implications, few case studies are attempted to demonstrate the political economy and transaction cost dimensions of water sector reforms. While discussing these evidences and case studies, wherever relevant, we will also consider issues such as the following: Do the nature and extent of reform differ in countries at different stages of economic and social development? Are the social pressures for reform powerful to overcome political economy constraints? How is the reform design used to galvanize political and social groups? Are the political and social contexts (e.g., war, political crisis, drought, and macro economic reform) used strategically to build pro-reform coalitions? Are there any evidences for the dynamics of social and political groups before, during, and after the reform process?

### **5.1. Instances for the Effects of Institutional Linkages**

As noted already, all the technical aspects of institutions ranging from path dependency to embeddedness have their origin in institutional linkages. It is precisely for this reason that institutional linkages have a special place in institutional economics (e.g., North, 1990a: 22). Since each institutional change became the foundation for subsequent and higher level

institutional changes, the cost of each subsequent institutional change can decline, suggesting the presence of substantial scale economies in institutional change (North, 1990a: 95). There are also scale economies on the performance side as well. Not only does the performance of lower level rules hinges on the performance of their higher level counterparts but also their synergy and scale economy effects ensure that the aggregate performance implications of a set of hierarchically nested rules are much more than the sum of their individual performances. For instance, although there was a large initial setup cost in creating *de novo* institutions such as the US Constitution of 1787, the “inter-dependent web of an institutional matrix produces massive increasing returns” and also could minimize the negative performance implications of inefficient individual institutional components (North, 1990a: 95&100).

Institutional linkages also have the effects of correcting mutual defects among institutional components. Since the laws and constitution are not self-enforcing, organizational mechanisms are needed for their enforcement. Such mechanisms, if effective, correct some of the defects associated with the legal system itself (North, 1997: 4). But, when these mechanisms are themselves defective, they can also turn an otherwise effective legal system into an ineffective one (Williamson 1994: 18–19). The hierarchical and nested features of institutions are also significant for deepening institutions and their performance. With stronger functional linkages among institutional components, their individual performance becomes inseparable from their collective performance. For instance, by distinguishing three levels of rules, i.e., constitutional-choice rules, collective-choice rules, and operational choice rules, Ostrom (1990: 52-53) show how these rules are nested and sequentially linked within a hierarchical system such that the collective-choice rules are derived from constitutional-choice rules and the operational-choice rules are, in turn, derived from the collective-choice rules.

Apart from the scale economy effects on the performance side, the nested nature of institutions and their linkages can also be exploited to minimize the total transaction cost of institutional change through a careful strategy of institutional prioritization, sequencing, and packaging. For instance, as the cost of changing institutional rules varies across its components, political regimes, and time periods (Ostrom, 1990: 140-141), there is scope for benefiting from institutional prioritization, favorable political climate, and reform timing. Interestingly, Saleth and Dinar (2003) have quantitatively evaluated the institutional and performance linkages by modeling various facets of institutional linkages and institution-performance linkages (see Figure 1 and 2) as a simultaneous equation system and using the perception-based information from 127 water experts from 43 countries/regions. Using the estimated coefficients of the system, they have also formalized the ‘impact transmission channels’ that trace the effect of a change in one institutional aspect on its downstream institutional chains. The analysis of these impact transmission channels are, then, used to derive the implications for reform design and implementation principles.

Based on a carefully conducted study of reform process and policy implementation in different countries, White (1990) has concluded that the way the reform program is structured and packaged has much to contribute to its successful implementation. Institutional packaging, i.e., the linking of institutional reforms with other economic programs, can also be used to build the political coalition needed to support the reform program (White, 1990). More generally, the issue of packaging involves not only the linking of institutional reform with other incentive

programs but also the combining of two or more institutional components/aspects.<sup>15</sup> Instances for combining economic incentives within the reform package include the provision of matching grants and a share in the collection of water charges to water user associations (WUAs) during irrigation management transfer programs.<sup>16</sup> Similarly, irrigation management transfer program also involves the component of system improvement and modernization, which, again, has an incentive effect on the transfer process. Both these forms of reform packaging are practices actually adopted in many countries including India, the Philippines, Turkey, and Mexico.

There are many instances for institutional sequencing in the recent water reforms of a number of countries. As illustrations, let us indicate few of them. An efficiently functioning network of WUAs at various levels is a precondition not just for cost recovery and system maintenance but equally also for the enforcement and monitoring of an effective water right system. Water rights system can, in turn, contribute to the realization of other institutional aspects such as cost recovery, accountability, conflict resolution, and water markets. The experiences in countries such as Mexico and India demonstrate clearly that WUAs have indeed contributed to cost recovery and improved system management. While the WUAs in these cases do play a role in ensuring accountability and resolving conflicts, they have not yet become the organization foundation for water rights system and water markets. The experience of Australia shows, on the other hand, that reform components such as irrigation privatization and water market can go together.

The experiences of Australia and California also demonstrate the scope for more advanced forms of institutional sequencing. The existence of water rights system and the basin organization such as the Murray-Darling River Commission have enabled the concerned Australia to formulate and implement the Cap Program that aims to reduce water diversions to the 1993-94 use level in an effort to reduce soil salinity and water quality in the basins. The same institutional arrangements have also remained a basis for water rights reform, irrigation privatization program, and facilitating environmental allocation of water. In California, the presence of water rights system and the elaborate organizational framework for water management have facilitated additional institutions such as 'water banks'. Since these instances show how existing institutions provide scope for undertaking additional reforms or creating new institutions, they indicate how the transaction costs of creating the new institutions are reduced by the presence of appropriate institutions. In this sense, these and similar cases illustrate the scope not only for institutional sequencing but also for scale economies in institutional reform. In countries such as Mexico and Argentina, among others, water reforms also involved sectoral

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<sup>15</sup> In the latter case, it is useful to combine institutional components/aspects with differential levels and gestation periods of impact. While the institutional components/aspects with immediate and noticeable performance returns have the tactical role of maintaining the economic and political relevance of the reform process, others are critical to ensure the long-term sustainability of institutional reform through a gradual but concerted effort to strengthen the institutional structure.

<sup>16</sup> The matching grant means that the government will match the amount collected by the WUAs from each of its members (i.e., farmers) for creating an initial fund to support the organization. This grant and the share in the collection of water charges (usually, about 10 percent of the total proceeds) are used to provide incentives for WUAs, which are in the form of induced collective action initiatives.

sequencing in that urban water reforms proceeded before the irrigation sector reforms. In the case of Mexico, policy and legal reforms have also preceded over the organizational reforms.

On the question of scale and dose of institutional reforms, the recent experiences of China, India, Mexico (as well as many Latin American countries) show that since water reforms form part of the larger program of macro economic reform, there were considerable synergy and scale effects powerful enough to neutralize the political economy constraints. The experience of South America is also the same as water reform formed part of the political reform. The irrigation reforms in Mexico as well as in the Indian states of Andhra Pradesh and Madhya Pradesh were based on a 'big bang' rather than a 'gradualistic' approach suggesting both the scale and political economy advantages in undertaking reforms at one go. The scale of reform effort also has a time dimension, as additional reform effort can be undertaken either simultaneously or sequentially with appropriate time gaps. The issue of when to make the additional reform effort, however, depends not only on the prevailing political climate but also on whether the performance impact associated with the institutional change is immediate or delayed.

As to the important role of institutional environment in determining the effectiveness of institutions, North (1990a: 101) provides an interesting historical instance. That is, the adoption of the U.S. constitution by many Latin American countries and western property rights laws by many developing countries has not been as successful as expected because "the enforcement mechanism, the norms of behavior, and the subjective model or models of the actors are not the same." Thus, institutional similarity does not necessarily assure performance consistency across contexts. Based on a review of water institutional changes in 11 countries (Mexico, Chile, Brazil, Spain, Morocco, Israel, South Africa, Sri Lanka, Australia, China, and India), Saleth and Dinar (2000) have argued that water reform in these countries are more due to factors exogenous to water sector (e.g., macro economic crisis, political reform, natural calamities, and technological progress) than due to those endogenous to the sector (e.g., water scarcity, performance deterioration, and financial non-viability). Notably, this observation applies, more or less equally to both the developed and developing countries.

As noted already, the water reform initiatives in China and India as well as in most Latin American countries can be traced to their macroeconomic reforms of the late 1980s (Savedoff and Siller, 1999; Saleth and Dinar 2000). Almost similar is the role of environmental factors including drought, floods, and salinity as illustrated respectively by the cases of California, China, and Australia. Similarly, international agreements (e.g., the Water Directive of European Community, World Trade Organization, and water sharing agreements) also play an equally important role in explaining reform in different countries. Notably, these exogenous factors are as important in advanced countries as in developing and transition economies. In many instances, the institutional environment, as defined by exogenous factors, provides a better explanation as to why similar institutional policies have differential performance across countries. Performance variations in the irrigation management turnover policy across countries (Johnson, 1997; Vermillion, 1997) and basin level organizations (Kliot, Shmueli, and Shamir, 1997) are cases in point. These instances show that political and legal commitments to declared policies, though necessary, are not sufficient in the face of administrative inadequacy and other

bottlenecks, including the structural basis of the political system (e.g., federal vs. unitary form or presidential vs. parliamentary form).

## 5.2. Water Reform in India: A Transaction Cost Perspective

The socio-economic consequences of widespread groundwater depletion, ecological costs of large scale water development projects, storage loss from siltation, and command area loss to water logging and salinity have remained the fundamental factors providing a strong economic motivation for water institutional reforms. Unfortunately, the financial and performance crises of the water sector have failed to gather the political economy thrust needed for prompting concrete actions. From an institutional transaction cost perspective, what this means is the fact that although the opportunity costs of inaction were high, the perceived political costs of taking actions were still higher to undermine the reform initiatives.

Fortunately, there were a number of developments—mostly exogenous to water sector—since mid-1970s that have not only reduced the political costs but also magnified the opportunity costs of water institutional reforms. For instance, the earlier practice of making water policy subservient to food self-sufficiency policy has lost its relevance when India eliminated food imports in 1971 and started building a comfortable buffer stock (often going beyond 20 million tons in recent years). Although the first National Water Policy was prompted by a water-related phenomenon of the widespread drought of 1987, it is the political and media fallout associated with this natural event that, in fact, galvanized the necessary political will to declare even such a simple and non-binding policy statement. But, the transaction cost calculus with respect to water institutional reform changed rather dramatically with the macro economic crisis of the late 1980s and subsequent declaration of the New Economic Policy of 1991 focusing on financial discipline, economic liberalization, and liquidation of public sector enterprises.

The major impact of the New Economic Policy on the water sector has been a radical decline in its budgetary share. For instance, the share of the irrigation sector alone has declined from 23 percent of total plan expenditure in the 1950s to 7 percent in recent years. In the wake such budgetary cuts, water-related departments were forced to take a harder look into the ways of cost saving and fund raising within the sector itself. At the same time, farm lobbies that were resisting water rate revision have also realized that farm income is getting increasingly affected by unreliable water supply from poorly maintained irrigation systems. It is these macro economic conditions and their micro economic consequences that have magnified the opportunity costs of reforms from the perspective of both the government and water users. The situation, therefore, has become favorable to revise water rates, involve farmers in cost recovery and system maintenance, and consider broader water sector reforms. It is in this particular environment characterized by economy-wide reforms that the central government constituted the committees to look into issues such as water pricing and private sector participation and the state governments went for options such as autonomous corporations and private sector participation.<sup>17</sup>

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<sup>17</sup> These changes in the case of Andhra Pradesh, Karnataka, and Maharashtra also have an ulterior motive as they use these unconventional means of financing water projects so as to establish their control over water resources in the Krishna basin before the tribunal award comes for renegotiation.



The revival of interest on many policies that were considered once as anathema or impractical (e.g., irrigation privatization, volumetric water allocation, water rights, and moving water into the concurrent list) indicates the changing balance in the policy debate. This is certainly a positive development and augurs well for the prospects of more substantive reforms in future. From another perspective, the economic and trade liberalization policies initiated since 1991 have also produced significant scale economies in terms of their synergetic effects on water sector reforms. Since water sector reforms form part of an economy-wide reform, the political economy costs of the former became a small proportion of the latter.<sup>18</sup> Meanwhile, international lending agencies (e.g., World Bank and Asian Development Bank) also have considerable influence on the nature and direction of water sector reforms. For instance, most of the organizational reforms, including the promotion of basin-based organizations observed in states such as Andhra Pradesh, Tamil Nadu, Orissa, and Uttar Pradesh, were introduced under different World Bank-funded projects.

The transaction cost and political economy-based explanations apply not only to the general institutional changes observed at the macro level but also to the specific institutional changes occurring at the state and local levels. For instance, groundwater markets have emerged as the private costs of their creation/emergence are lower than their private benefits to individual farmers. This does not mean that they are free from social costs such as the implicit/illegal sales of power, violation of proportional sharing principle, and aquifer depletion (Saleth, 1996). But, these costs have not entered into the transaction cost calculus because they are *perceived* by the state to be lower than the economic and political costs of creating the institutions necessary for regulating them. But, this reckoning cannot remain this way for long as the transaction cost calculus of groundwater markets may get reversed with new developments. We also note, while passing, that all the water-related local conventions and contracts that we have discussed earlier are also amenable for transaction cost-based explanations, though the calculus in these cases involves mostly private costs and benefits.

The irrigation management transfer program implemented both in Andhra Pradesh and Madhya Pradesh also has a perfect explanation within the institutional transaction cost framework. While there are committed change agents on all sides—the state, bureaucracy, donors, research/training organizations, and the people, the actual forces for change have their origin in the changing political economy realities of these states. The heavy fiscal burden of irrigation subsidy has convinced the state, the bureaucracy, and the donors of the need for transferring the irrigation system to farmer groups. The economic threats of an increasing productivity loss from the poorly maintained irrigation system—documented well by research organizations<sup>19</sup> and personally experienced often by farmers—have convinced them of the key role that farmers, as a group, have to play in improving farm productivity and system efficiency.

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<sup>18</sup> This fact clearly underlines the transaction cost implications and strategic significance of timing and packaging the water sector reform so as to make it coincide with and form part of a larger economy-wide reform program.

<sup>19</sup> International best practices and research-based knowledge produced by organizations such as the International Water Management Institute (IWMI) have also played a catalytic role in reducing the transaction costs of irrigation management transfer programs, especially in Andhra Pradesh and Madhya Pradesh.

Though it is seldom recognized explicitly, the political groups have also viewed the program as an opportunity to build their grassroots organizations and local groups found them as an additional avenue for assuming social status and power. Since the program is viewed as a logical part of the process of decentralization centered on *panchayat* system (particularly in Madhya Pradesh), it is also perceived to have a considerable political mileage for ruling parties, especially during the election years.<sup>20</sup> Thus, from the perspective of all stakeholders, the transaction costs were reckoned to be far lower than the opportunity costs (i.e., the foregone potential benefits) of not implementing this program in the particular institutional environment faced by these states when the program was actually implemented.

While Indian water sector is gradually coming out of the bureaucratic grip and myopic political considerations, it has not yet fully matured to be influenced mainly by economic and technical forces. Unfortunately, the divisive role of political factors is likely to increase, especially on the issue of inter-state water sharing, as most rivers in India are shared by two or more states. As the basin resources are fully appropriated, additional claims will be politically more acrimonious unless institutional arrangements are created to catalyze negotiated settlements and mutual agreements. But, the issue has become complicated by the proposed 'Garland Scheme' for linking rivers, especially when the central government lacks the legal powers and political will to implement the Scheme, though it has the technical and financial arrangements to complete most of the feasibility studies for various links. It is in this political vacuum and indecisive environment that the Supreme Court has been invoked to ask the government to report on the feasibility and prospects of this Scheme. This legal injunction has, in fact, reduced the political transaction costs for the Scheme, which is one of the long-term but somewhat tricky options for India to address its water shortage problems.

### 5.3. Water Reform in Mexico: A Political Economy Perspective

Recent reforms in Mexican water institutions provide an interesting case for the powerful role of political economy factors.<sup>21</sup> The irrigation and urban water sectors reforms undertaken by Mexico since the late 1980s have two major thrusts: (a) decentralization and user participation and (b) the adoption of economic instruments for cost recovery and demand management. As in the case of India, the factors motivating these reforms were external to both water sector and water institutions. For instance, decentralization was politically motivated whereas cost recovery was a necessary response to economic circumstances. Indeed, the factors that influenced the reform process such as the urbanization, globalization, political pluralism, changing prices due to North American Free Trade Agreement (NAFTA), changing land use, and fiscal crisis are external to water sector (Hearne, 2003). This does not mean that endogenous factors such as

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<sup>20</sup> The irrigation management program in Madhya Pradesh was quicker and smoother than in Andhra Pradesh in view of the facilitative role of the decentralization process that was implemented before the transfer program. This is an evidence for the advantage of sequencing two different but operationally related reform components in terms of the favorable effects of the earlier program on the transaction costs (especially its implementation cost component) of the latter program. But, it is necessary to note that these reform sequencing in both states has happened more by default than by design.

<sup>21</sup> This Mexican case study provided below draws largely from the recent paper of Hearne (2003).

declining groundwater table, water shortage, and deteriorating water quality were less significant. What happened, in fact, is that the opportunity costs of these endogenous factors have been magnified by the exogenous factors to give the necessary political economy thrust for reform initiation.

While the Mexico was able to enhance public expenditures with international borrowing and maintain an overvalued currency with high oil prices during the 1970s, this was no longer possible when oil prices fell and debt crisis emerged during the 1980s. The policies adopted to solve the economic crisis included NAFTA, increased trade, and the privatization of certain state enterprises. Since NAFTA has required the elimination of subsidies for most agricultural inputs and outputs and the economic crisis has necessitated a reduction in government spending, the Mexican government was forced to undertake several reforms in the water sector with a larger share of both subsidies and public investment. These reforms include the management transfer of all the Irrigation Districts and the promotion of private sector and local government in urban water sector. Water rates both in irrigation and urban sectors were also revised to improve cost recovery in the water sector.

While economic crisis of the 1980s has remained a major factor precipitating water sector decentralization, the trend towards decentralization has started much before and it has its roots in the changing power balance of various political groups (Rodriguez, 1997). For decades, Mexico had a centralized political system with a dominant presidency coming usually from the Institutional Revolutionary Party (PRI), the single party that dominated Mexican politics from the inception. With a centralized system of political power and fiscal resources, all regional and local governments were dependent extremely on the federal government. Although decentralization was intended essentially to decentralize governmental functions and to distribute jobs and patronage geographically, it was resisted. However, after economic crises in the 1980s and with the electoral defeats of PRI in 1988 and in 2000, other political parties have become powerful to claim the presidency and several state governorships. It is the emergence of this 'political pluralism' that has initiated the trend towards decentralization (Pineda, 2002).

Despite the moves to decentralize government functions and decision-making, the Comisión Nacional del Agua (CNA), the apex body that develop and manage water resources in Mexico has maintained centralized control and federal proprietorship over Mexican water resources. Yet, this centralized arrangement has been conducive for decentralization, as the CNA, as mandated by the President, has led the water institutional reform process involving a large scale program of irrigation management transfer and a substantial degree of privatization and localization of urban water services.<sup>22</sup> The water policy reforms that were initiated in the mid-1990s can be traced to the National Water Plans being prepared since 1975 as part of Mexico's periodic National Development Plans (Hearne, 2003). The preparation of these water plans was supported by the United Nations Development Programme and the World Bank.

Water institutional reforms in Mexico are characterized by the establishment of ambitious long-term goals and their gradual and deliberate implementation. The 1992 National Water Law

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<sup>22</sup> This case shows clearly that a dose of centralization is inevitable even in promoting decentralization program. Otherwise, the decentralization process will not be that fast or effective.

presented an ambitious reform program that will take decades for its effective implementation. Irrigation management transfer program was initiated with this law and has progressed rapidly and smoothly. Since this program was implemented with a 'big bang' approach, the whole process of transfer was completed within a span of two years. But, a careful look at the way the program was implemented will reveal that there has been a sequencing element, as it was implemented, on a pilot scale, in selected districts and the lessons learned were carried forward when the program was extended to other districts. Meanwhile, the efforts to link the agricultural input supply and extension systems with the WUAs provide an instance for institutional packaging during the reform process (Johnson, 1997). Although the irrigation sector reform was guided from above, there has been generally a favorable response from the user groups (Palacios, 2000).

Institutional sequencing has also been followed in other reform spheres. For instance, although the 1992 law authorized the creations of watershed councils and technical groundwater committees, these institutions (57 of them) were created only after the completion of the irrigation management transfer program. This is because the prior existence of WUAs is essential, as some of these councils/committees are to be the members of the WUAs. There is also prioritization and sequencing while creating the watershed councils, as the basins with more severe problems (e.g., Lerma and Rio Bravo) received priority over the remaining basins. The reform in the urban water sector started from the Mexico City with a deliberate three-stage implementing the privatization plan. Since such a cautious and gradualistic approach involved minimal private sector participation with no immediate long-term commitment, it had the advantage of neutralizing political opposition during the initial years of the reform. The same has also been true with the gradual process with which the urban water sector in other parts of Mexico was brought to the management of the regional and local authorities (Hearne, 2003). But, when the reform has reached a matured stage, the changes have already become entrenched making that it to be very costly to reverse. With these reforms in the irrigation and urban sectors, additional and marginal changes (e.g., water rates revision and cost recovery) become also easier. In this respect, the Mexican reform provides cases for the strategic use of both path dependency features as well as scale economies to counter political economy constraints.

## **6. CONCLUSIONS AND POLICY IMPLICATIONS**

This chapter has made an attempt to address the issue of why the conventional transaction cost approach fails to provide an adequate explanation for the emergence of institutional change. The argument is based on the exclusion of the transaction cost implications of the institutional linkages originating both from the endogenous features of institutional structure and the exogenous features of its institutional environment. This chapter has theoretically explained the origin of institutional linkages based on the discussion of institutional features and has also analytically demonstrated them with the application of the Institutional Analysis and Development framework in the particular context of water institutions. A generalized transaction cost framework has also been outlined with the incorporation of the transaction cost implications of the institutional linkages and the political economy constraints. Anecdotal evidences from cross-country experiences were provided for illustrating how institutional linkages can be used to to derive reform design and implementation principles such as

institutional prioritization, sequencing, and packaging as well as reform timing and scale. These evidences cover the reform experiments both in general and in water sector contexts. Two detailed case studies—one from India and another from Mexico—are also given to explain the water sector reform process from an institutional transaction cost and political economy perspectives.

From a theoretical and policy perspectives, both the analytical approaches and the anecdotal and case study-based evidences leave a number of interesting ideas to think over and pursue further. The identification of a strategy for institutional reform with minimum transaction costs and maximum political acceptability requires a much sharper understanding of the analytical and operational linkages within institutions as well as between them and their institutional environment. Such an understanding enables us to derive reform design and implementation principles that can minimize transaction costs and maximize political prospects of reform. In this context, the analytical framework used for institutional decomposition and linkage identification in this chapter can be a very useful tool. For this purpose, a broader conceptual perspective of the reform process is necessary so that all relevant factors can be brought into the reform calculus.

While considering water institutional reforms, we have to consider not just the institutional structure but also the present and probable changes in the broader institutional environment within which the former evolves and operates. Such a larger perspective allows us to exploit the potential synergy from these changes with a better coordination and timing. In this respect, the generalized transaction cost framework outlined in this chapter proves extremely valuable. The incorporation of institutional linkages or the political economy constraints need not cause any imprecision or dilute the neo-classical rigor of the transaction cost theory, as the effects of institutional linkages can be fairly quantified in terms impact transmission coefficients (e.g., Saleth and Dinar, 2003) and the political economy constraints can be captured in terms of political risks (e.g., Dinar, Balakrishnan, and Wambia, 2003) estimated using, for instance, information collected from suitably conducted perception surveys of stakeholders.

Although the cross-country review of recent water sector reforms suggests a dominant role of exogenous factors such economic crisis, political reforms, and natural events, this does not mean the endogenous factors such as water scarcity and poor financial operational performance of water sector are less important. In fact, the reverse is the case, as the exogenous factors only give the popular attention and political thrust to the opportunity costs of inaction. While the political economy factors do constrain the reform process, they also provide opportunities for facilitating the reform and its implementation, as has been shown by the case studies from India and Mexico. Reform design and implementation principles such institutional sequencing and packaging can be used to neutralize political opposition by spacing the reform components and building a pro-reform coalition. Finally, the chapter and its results also imply that research based knowledge, especially on the internal dynamics of institutional linkages and on the cross-country experience of reform process, can itself form as one of the key instruments for facilitating and guiding institutional reform in various sectors.

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