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## DOING INSTITUTIONAL ANALYSIS: IMPLICATIONS FOR THE STUDY OF INNOVATIONS

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# Doing Institutional Analysis:

# Implications for the Study of Innovations

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## ABSTRACT

The study of institutions and innovativeness are presently high on the agenda of the social sciences. There is increasing concern with how a society´s innovativeness is associated with its international competitiveness. And as scholars study why the innovative styles of societies vary there has been increasing concern with how the institutional makeup of a society influences its particular style of innovativeness. However, before there can be significant advance in the study of this problem, it is important that we have a better understanding of what constitutes institutional analysis. Every social science discipline -- with the exception of psychology -- has at least one distinctive strategy for doing institutional analysis. And it is because of the lack of consensus as to the appropriate boundaries and content of institutional analysis that we have limited ability to make theoretical advance in understanding how the institutional makeup of a society impacts on its innovativeness. Recognizing that this is a serious problem for the social sciences, this paper attempts to structure the field of institutional analysis and takes the first steps in relating it to the study of a society´s style of innovativeness.



## KEYWORDS

Incremental and radical innovations; institutional arrangements; institutions; organizations; path dependency; social system of production

## BIOGRAPHICAL NOTE

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## INTRODUCTION *

This paper addresses two issues which are currently high on the agenda of the social sciences: (l) why do societies vary in their style of innovativeness, and (2) how should we go about doing institutional analysis. While these are often treated as separate issues, this paper makes some effort to relate the two subject areas to one another.

For some years, the economics literature has argued that a country's innovative capacity is linked to its international competitiveness (Landes, 1969, 1998; Nelson, 1993). Yet, we are greatly lacking a theoretical understanding of why countries vary in their innovative styles. Why, for example, do some advanced industrial countries, time and time again, make radical breakthroughs in basic and applied science and develop radically new products -- and even new industries? And why do other countries rarely make any radical breakthroughs in basic and applied science or in product development, but continuously make incremental advances in knowledge, improve upon newly developed products, and even become the dominant producers in these market segments?

Why the innovative styles of countries vary is a complex problem. But much of the variation in innovative styles across societies is due to their institutional configuration. Institutions may either constrain or facilitate innovativeness (Hage and Hollingsworth, 2000; Edquist, 1997; Langlois and Robertson, 1995), but at present, we do not have a good understanding of how the institutional makeup of a society is associated with its style of innovativeness. This is due to the fact that the comprehension of the institutional structures of societies is in a state of confusion. Hence a major argument of this paper is that before we can understand how the institutional configuration of a society influences its style of innovativeness, we must first identify the various components of the institutional makeup of a society and understand how these components are related to each other. The latter part of the paper explains how the institutional makeup of a society is related to its style of innovativeness.

At present, it is difficult to relate institutional analysis to innovativeness because our theories of both areas are poorly developed. Even so, we are now at a strategic moment, because we can build on a rich body of literature on institutionalism and innovativeness in order to advance our theory of each and to integrate the two fields.

For some years, much of the literature on technological innovation has emerged from a focus on the firm (Dosi, 1988; Fransman, 1944; Langlois and Robertson, 1995; Whitley, 2000). For example, Alfred Chandler's great corpus of work (1962, 1977, 1990) has tended to emphasize how the success of a firm's technological innovativeness -- both across countries and over time -- has been influenced primarily by whether it has the right strategy and structure. For Chandler, firms which have had the right strategy and structure have ended up having the organizational capabilities which permitted them to have the economies of scale and scope to develop cost advantages over their competitors (Teece, 1993). Chandler's work has had a profound influence on the management literature of the past couple of decades. Hence, in the Chandlerian tradition, much of that literature has suggested that the key to understanding the competitive advantage of firms is to identify their strategies and organizational structures.

Over time, another literature has emerged which emphasizes the importance of the institutional environment of firms for understanding why firms in some countries excel in some industries but not in others, and why the firms in a specific country may excel in a particular industry at one time but may eventually lose that advantage (Landes, 1969, 1998; North, 1981, 1990). More recently, Richard Nelson and his co-workers have been advancing this literature by working at the frontiers of integrating the literature on institutions, firm strategy, and technological innovation (Nelson, 1994, 1995a, 1995b, 1996; Mowery and Nelson, 1999; Murmann, 1998; Arora, Landau, and Rosenberg, 1998).

The Nelson school correctly assumes that since we do not presently have an adequate theory on how institutions, firms, and technologies co-evolve, we are not at a stage to test a set of formal hypotheses which flow from some well-defined model. Hence the Nelson school have collectively been developing descriptive studies of how institutions, firm capabilities, and

technologies co-evolve so that particular societies and firms at specific moments in time excel in particular kinds of innovations. The goal of this kind of work has been to develop, by working inductively, a better understanding of the processes of how technologies, firms, and institutions co-evolve across a number of industries and countries.

A variety of endowments in the institutional environment provide economic actors/firms with initial advantages or disadvantages for particular types of technological activity (Murmann, 1988: Chapter seven). But over time everything is dynamic, and the larger global and institutional environments, the capabilities of firms, and the performance of firms all co-evolve and feedback onto one another. However, institutional environments differ widely from one society to another, and the successful firms and organizations are those which can best adapt their activities to the institutional environment within which they are embedded. Once a number of firms in a particular industry are successful, however, they may be able to engage in collective action to modify their institutional environment in order to enhance their innovativeness and their technological competitiveness. The studies of the Nelson group have been particularly important in advancing the argument that the interaction among actors and their institutional environment is a multi-faceted process and that successful actors over time must not simply respond to the institutional environment in which they are embedded but must modify their environment in order to maintain competitive advantages.

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Figure 1

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As these comments suggest, the work of Nelson and his colleagues is very promising for understanding why societies vary in their capacity to excel in various industries. However, to extend and complement their work, we need a greater understanding and consensus of the meaning of institutions and the institutional environment of firms. Hence, this paper is written in the spirit of complementing the agenda of Nelson and his colleagues. One of its goals is to develop a map of what can be called the terrain of institutional analysis. It assumes that until we

have a map of this terrain, scholars working in the broad field of institutional analysis will not comprehend how their work relates to one another.

Institutional analysis is now rather high on the research agenda of the social sciences. However, we need to be aware of the obstacles confronting us as we attempt to advance an agenda of institutional analysis. There is no consensus as to what is meant by institutions, or by institutional analysis. These terms are very widely used, but they are used with different conceptualizations, and the scholars who use them share little common ground. Until scholars have some consensus about the meaning of the concepts they use, their potential to bring about effective advancement of knowledge is somewhat limited. Thus, the widespread interest in several academic disciplines in the concepts institutions and institutional analysis may well promise more than it can deliver, given the organizational and disciplinary fragmentation of contemporary universities.

There are many different approaches to the study of institutions (Nelson and Sampat, 1998): There are the new and the old institutionalism (Stinchcombe, 1997; Hodgson, 1998; Langlois, 1986, 1989); there is historical institutionalism (Steimo, Thelen, and Longstreth, 1992; Zysman, 1994; Immergut, 1998; Katznelson, 1998); and several of the social sciences have their own distinctive approaches to the study of institutions (Hall and Taylor, 1996; Hodgson, 1988; Eggertsson, 1990; Finnemore, 1996; Scott, 1994; Calvert, 1995; Hechter and Kanazawa, 1997).

The following comments reflect some of the confusion in utilizing the concept 'institution'. Nobel laureate Douglass North in his book Institutions, Institutional Change, and Economic Performance (1990:3) defines institutions as 'rules of the game in a society'. To North, institutions are constraints which shape human interaction, and the way that societies evolve through time. On the other hand, Andrew Schotter argues that institutions 'are not rules of the game'. Rather, institutions are the behavior that follows from rules. Briefly, he is concerned with what actors do with rules, but not with what the rules are (Schotter, 1981: 155). Many other examples might be given to illustrate the heterogeneity of approach to institutions and institutional analysis. Even if scholars were to agree with North that rules and norms are

institutions, they would not necessarily agree on what a rule is. Shimanoff, for example, has identified more than 100 synonyms for the concept rule (Shimanoff, 1980:57, Ostrom, 1986:5).

Another critical issue in the institutional literature is the relationship between institutions and organizations. North (1990), following from his definition of institutions, argues that institutions and organizations are distinct entities. Which organizations come into being and how they evolve through time is influenced by a society's rules and norms, that is by its 'institutions'. On the other hand, a number of recent organizational sociologists see very little difference between institutions and organizations. For them, rules and norms are institutions, which unfold in tandem with organizational structures and processes, and changes in organizational forms internalize and reflect changes in the society's rules and norms. Using this perspective, a whole sub-discipline within sociology called the 'new institutionalism' in organizational analysis has emerged. The 'institutionalist' perspective on organizations assumes that the kinds of organizations which actors create are dictated by the cultural norms and rules in which they are embedded (Powell and DiMaggio, 1991; Zucker, 1988, 1991).

The importance of this disagreement about institutions is obvious. If institutions are so critical for understanding our societies, it is important that we come to some systematic consensus as to what institutions are, and how they influence social actors and the organizations that they create. If we cannot do so, we risk talking past one another, and losing the opportunities for cumulative knowledge based on articulation of widely shared theoretical understanding.

We need not only conceptual clarification as to what institutions are, but also greater consensus as to how to study institutions. No scientific field can advance very far if the practitioners do not share a common understanding of the key concepts used in their analysis (Ostrom, 1986:4). But with our universities and academic associations so fragmented into different disciplines and into various subspecialties within disciplines, it is difficult to advance the theoretical agenda of institutional analysis within the academy. Indeed, the disciplinary fragmentation of the modern university is a major barrier to the theoretical advancement of the study of institutions and innovations as well as most other hybrid fields of research

(Hollingsworth, 1984; Hollingsworth and Hollingsworth, 2000). And it will be only as a result of effective communication across diverse fields of knowledge that our study of institutions and innovativeness will be effectively advanced.

## MULTIPLE LEVELS OF INSTITUTIONAL ANALYSIS AND INSTITUTIONAL CHANGE

There are innumerable signs that we are living in a time of great institutional change: the demise of the Soviet empire; the processes of European political and economic integration; rapid transformation in parts of the global economy; the disintegration of the family structure; the weakening of voluntary associations and the decline in political participation in a number of advanced capitalist societies; the weakening of welfare states. European law is superseding national law and is even changing complete national legal systems. The list could go on and on.

Even though scholars discuss institutional change at length, their ability to measure the rate of institutional change is very limited. And more crucial than the limited ability of scholars to measure institutional change, is that they also have very limited understanding of how to build new institutions. One of the reasons for these shortcomings is that the social sciences are deficient in a theory of institutions. The building of new institutions and redressing the decline of some of the most important institutions of our societies are among the most important problems of our time. If we are to advance in the development of a theory of institutions, we need to work collaboratively across the social sciences, and we need to define the parameters of institutional analysis.

### First level of analysis

This paper attempts to make some modest contribution to outlining the parameters of institutional analysis. At the outset, we need to recognize that when we engage in institutional analysis, we must be sensitive to multiple levels of reality. As suggested above, most scholars who engage in institutional analysis do not participate in any coordinated activity with each other, and their activity is fragmented into a variety of disciplines and sub-disciplines. To

establish some coherence to the field of institutional analysis, we need a map of the field so that those working in one area can see where their research fits in relation to other areas and other practitioners on the map.

Figure 2 presents such a map, with multiple levels at which institutional analysis occurs. Theoretically, each of these areas on the map is interrelated with each other level. However, the various areas/components on the map are arranged in descending order of stability or permanence. Those components at higher levels of reality are more permanent and durable, while those at lower levels change more rapidly.

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Figure 2 About Here

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Were scholars doing institutional analysis able to reach some consensus about where their own work fits in relation to all other practitioners in the field, there would be increased potential for all practitioners to communicate with each other. By analogy, once geneticists, crystallographers, biochemists, etc. had a good understanding of how their investigations were related to each area of molecular biology, the field quickly was able to make theoretical advances (Judson, 1979).

At the first level, there are the **basic norms, rules, conventions, habits, and values** of a society. These are the most fundamental properties of institutions and are the most enduring and resistant to change. Rules, norms, conventions, etc. are institutions, but are only one component of what constitutes institutional analysis. As Burns and Dietz (2001 forthcoming) point out, most human activity is organized and regulated by norms and rules and systems of rules. These concepts are extremely important for institutional analysis, as they exert the greatest influence on the nature of the components of institutional analysis at the next four levels which are depicted in Figure 2. In most forms of social analysis, it is extremely important that we understand the social and cognitive conditions that lead to compliance or non-compliance of rules, and the conditions which lead to changes in rules.

The approach to the study of institutions employed here argues that norms, rules, habits, conventions and values both reflect and shape the preferences of actors. Norms, rules, habits, conventions, and values influence who and what are included in different types of decision making, how information is processed and structured, what action is taken (Shepsle, 1986, 1989). It is through norms and rules that behavior is judged to be democratic, fair, or egalitarian.

Burns and Flam (1987) point out that in most any society there are multiple rule systems. Within a family there are rules for decision making, often quite different from rules and norms for decision making for a professor in a classroom, or for the customer in a bank. Despite the heterogeneity of rule systems, there are meta rules and norms which encompass lesser rule systems. Otherwise there would be such contradictory rule systems that a society would be paralyzed. The existence of meta rule systems permit different rule systems to intersect with each other so that ambiguities can be resolved. The greater the pluralism and complexity of a society, the more ambiguity there is about meta rules and norms in a society, and of course, all ambiguities never completely disappear. Over all, the degree to which separate rule systems are interlinked is an empirical problem. There are different sectors, groups and interests pursuing their own action logic, but through higher order meta principles and rules there can be order, consensus, and coherence in a society. It is through a set of meta rules that class and ethnic conflict in societies are contained. (For elaboration, see Burns and Flam, 1987).

In many respects, our understanding about norms, rules, habits, conventions, and values influences our perspective on how societies are constructed and how they change. 'New institutionalists' (Posner,1992; Schotter, 1981; Williamson, 1975,1985) tend to assume that at one time there was a state of nature and that there was a movement from individuals to institutions -- an approach often called methodological individualism (Popper, 1961; Hodgson, 1998, 1999). And of course there are innumerable instances which methodological individualists cite to demonstrate that individuals create new rules of behavior. For example, it is possible for actors to change the rules of driving, so that instead of driving on the left side of the road, drivers adopt a new rule and drive on the right.

This paper, however, tends to equate social habits and institutions. As Hodgson and others remind us (Hodgson, 1988, 1989, 1997, 1999; Grafstein, 1992; Camic, 1986; Johnson, 1992; Nelson and Winter, 1982; Veblen, 1899), social habits are the results of earlier choices and are a means of avoiding endless deliberation. Because cognitive frameworks are learned through habit, individuals rely on the acquisition of such cognitive habits before reason, communication, choice, or action are possible.

Whereas Schotter (1981) and other game theorists take the individual as an agent unencumbered by previous habits, Field (1984) and others have stressed that there can be no games without prior norms and rules, and thus a set of norms and rules must be presumed at the start. Those who attempt to explain institutions from individual behavior alone are using a bad strategy (Hodgson, 1998).

The position here -- heavily influenced by Hodgson (1998, 1997, 1988) -- is that individuals are embedded in a complex institutional environment and that institutions not only constrain but also shape individuals (also see Hollingsworth and Boyer, 1997). It would be a mistake, however, to get involved in an infinite regress in order to determine which came first -- individuals or institutions. Of course, institutions are formed and changed by individuals, just as individuals are shaped and constrained by institutions. But at a macro level, it is institutions that provide a cognitive framework whereby individuals can cope with their reality. In this sense, the micro and macro worlds are intertwined. At the macro level, there is considerable stability, but at the micro level, individuals have a significant level of autonomy, and there can be widespread diversity. As Hodgson (1988) reminds us, most institutions in a temporal sense exist prior to the individuals in any given society.

It would be a serious mistake to downplay the importance of individuals and micro level analysis as we study institutions. In the final analysis, it is at the level of individuals where norms, rules, habits, conventions, and values exist. An individual is born into and socialized into groups and a society, and this is how one early in life acquires a sense of appropriate forms of behavior. Because of the way that individuals are socialized into a world of rules, norms, habits,

conventions, and values, it is unnecessary for individuals to restructure the world anew every day (Douglas, 1987; Elster, 1989). Every action does not have to be seriously reflected upon. For this reason, institutions provide cognitive frameworks for individuals, make their environments predictable, provide the information for coping with complex problems and environments. In the words of Johnson (1992: 26) 'Institutions reduce uncertainty, coordinate the use of knowledge, mediate conflicts, and provide incentive systems. By serving these functions institutions provide the stability necessary for the reproduction of society'. However, each society has different forms of habits, rules, and norms and hence different incentives and disincentive systems for learning and forgetting, for processing information. But because individuals have varying degrees of autonomy, individuals and groups can deviate from the prescribed forms of behavior in a society. And of course, these changes at the level of individuals become important in understanding processes of societal change.

These views are not meant to imply that the type of institutional analysis proposed herein approximates a general theory of society. This is clearly not the case. However, it is intended to represent the first steps in a mapping exercise of the boundaries of institutional analysis and to suggest a few methodological insights for studying institutions.

One should try to see norms and rules as continuous and not as dichotomous entities, to recognize that they come in varying strengths. Legro (1997) has suggested that we assess the robustness of norms and rules with three criteria: their simplicity, their durability, and their concordance. Simplicity refers to how well actors understand norms and rules, how well they can be applied within a specific situation. Some norms and rules can be so complex that actors can have considerable difficulty in applying them in specific cases. Durability addresses the issue of how long norms and rules have been in effect -- in short in order to assess their level of legitimacy. While the position of this paper is that norms, rules, and values are quite durable, they do vary in this respect. Concordance refers to how widely applied a norm or rule is. This addresses the degree to which a rule is a meta rule, the degree to which it incorporates the heterogeneity of other norms and rules. In sum, the clearer the norms and rules of a society, the

longer they have been in existence, and the more widely applicable they are, the greater their impact on a society. Hence, the more robust the norms and rules, the greater their impact on a society, and the less their robustness, the greater their flexibility and the less their effect on shaping a society's outcomes and performances.

Because norms, rules, and values are quite durable, they play an important role in shaping the history of societies, thus contributing to a great deal of path dependency. Actors attempt to adjust to their contemporary environment, but since they are products of the past, the historical legacy of norms, rules and values influences the decisions they make. Although actors have some capacity to alter the course of their history, they are constrained by their past, and the degree to which they can move beyond their past is limited. As Lanzara (1998), Johnson (1992) and others have argued, societal inertia is a basic feature of institutions. They provide the basic stability necessary for change. Degrees of history are continuously reproduced by the way in which the inhabitants of societies are socialized. History matters, but at critical points in history, there is punctuated equilibrium (Somit and Peterson, 1992). During most periods of history, there is considerable stability in the norms, rules, and values of a society, but at critical moments, norms, rules and values can quickly and dramatically be redefined. At all times, norms, rules, habits, conventions and values are influencing each of the other components in the institutional framework discussed below, but these other institutional components feedback and can modify rules, norms, conventions, etc. (Murmann, 1998).

**Second level of analysis**

The norms, rules, habits, conventions, and values of a society lead to the next level of analysis -- the **institutional arrangements** which are involved in the coordination of various economic actors: producers and suppliers of raw materials, knowledge, etc; processors of raw materials, information; workers; customers of raw materials, finished products, information, etc.; financiers; governmental and other types of regulators. These actors regularly engage in contests to resolve various economic problems in virtually all sectors of society: How are prices to be set? What quantity of various products is to be produced? How are standards of various products,

processes, etc. to be set? How is the quality of products and processes to be determined? How are various societal processes to be financed? In order to confront these problems and to address the conflicting positions of economic actors as they address these problems, societies develop various institutional (governance) arrangements for coordinating different actors. These consist of markets, various types of hierarchies and networks, associations, the state, communities, and clans (see Hollingsworth and Boyer, 1997, Campbell, Hollingsworth, and Lindberg, 1991: Chapter One).

Each of these particular kinds of coordinating mechanism has many different types. For example, there are many types of states (e.g., the regulatory state, developmental state, authoritarian state, welfare state), on which there is an extensive literature (Kim, 1997). Similarly, there are different types of markets, networks, different kinds of associations, etc. (Boyer, 1997; Hage and Alter 1997; Schneiberg and Hollingsworth, 1990). When we do institutional analysis, we must engage in configurative analysis, recognizing that actors are not coordinated or governed by a single type of institutional arrangement. Some of the literature discusses industrial sectors as though they are coordinated or governed by a single institutional arrangement, whereas in fact each sector of an economy is coordinated by a configuration of institutional arrangements. Some configurations coordinate actors in certain problem areas, while other configurations of institutional arrangements coordinate actors in addressing other problems. The types of configurations which are dominant in a society are somewhat stable and tend to persist over time within a society (Hodgson, 1999).

When one mode of coordination is dominant in a society, it will influence the role which other coordinating modes will play. Hence, the strong role of the state in the Soviet Union influenced the role of markets, associations, etc. in the governance of the Soviet economy. Similarly, the prominence of particular modes of coordination in a society influences its style of innovation.

Much of the literature on institutional arrangements (e.g., forms of economic coordination) remains fragmented and unintegrated. It is helpful to array these various forms of

coordination in a two-dimensional taxonomy, as in Figure 3. On the vertical dimension, the economist's view of a self-interested agent is contrasted with a more sociological perspective, according to which social rules, obligation and compliance shape human actions. On the horizontal dimension, there is another continuum (i.e., the distribution of power). At one extreme of the dimension, one finds many and relatively equal agents interacting (e.g., as in a well-organized spot market). At the other extreme, inequality in power results in a hierarchical form of coordination which structures the interaction between principals and agents or between leaders and followers. Where a society falls along the distribution of power is influenced by the rules, norms, values, etc. which are dominant in a society at a particular moment in time.

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Figure 3 About Here

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Institutional arrangements can be visualized on two dimensions: the nature of action motive on the one hand, and the distribution of power on the other. Markets (cell 1) combine self-interest with horizontal coordination transactors, and they reflect sensitivity to concerns about supply and demand, thus providing ex post an unintended equilibrium. Paradoxically, the more pure and perfect the market competition, the greater the need for codified rules of the games for coordinating economic transactions. Thus, collective associations (cell 6) and/or various forms of state intervention (cell 4) are required to develop and enforce rules for transacting partners (Schneiberg and Hollingsworth, 1990; Streeck and Schmitter, 1985a). This is an example of how the norms and rules and the institutional arrangements of a society are intertwined as reflected in a configuration of institutional or governance arrangements.

Along the horizontal axis, actors can be joined in an organization or a firm: A hierarchy is the generic terms for this institutional arrangement (cell 2). Along the horizontal line, one recognizes the difference between transactions in a market and transactions within a firm. The well known works of Coase (1960, 1981) and Williamson (1975, 1985) utilize the concept of transaction costs in explaining the emergence of corporate hierarchies.

There are also various types of networks (cell 5) which exhibit mixes of self-interest and social obligation, with some actors being formally independent and equal. Yet in some networks (the large firms and their sub-contractors), there is unequal power and initiative. Networks may constitute all kinds of actors; some consist only of firms but others include associations and the state (Hage and Alter, 1997).

The vertical axis deals with action motives. Toward the upper part of Figure 3, actors are engaged in individualistically oriented behavior, whereas toward the lower part, actors are more engaged in collective behavior and strive to cope with problems of common interest. Cell 3 -- communities and clans -- consists of institutional arrangements based on trust, reciprocity, or obligation, and thus are not derived from the pure selfish computation of pleasures and pains. This is an unconventional form of coordination for most neo-classical economists (however, see Arrow, 1974), but not for many anthropologists, political scientists, and sociologists (Streeck and Schmitter, 1985a; Polanyi, 1957; Gambetta, 1988; Fukuyama, 1995; Sabel, 1992; Putnam, 1993).

In the neoclassical paradigm, theorists argue that actors engage in forms of exchanges that best promote their individual interests. If some structural conditions are fulfilled (absence of increasing returns to scale, the reversibility of transactions, absence of uncertainty, and complete contingent markets, with no collusion between actors), then the invisible hand theorem applies, and market type activity functions quite well and also provides the optimum for society, thereby combining efficiency, harmony, and order. However, an excess of market activity may well lead to ruinous competition and excessive conflict. There is variation in the extent to which ruinous competition occurs, depending on the social context in which transactions take place. Thus, it is important that we be sensitive to the institutional context in which transactions are embedded and that we understand the degree to which social bonds exist at both the micro and macro levels of analysis. Micro bonds facilitate exchanges in a society, but at the societal level, social bonds exist at the level of the collective -- in the community or region, and among members of racial, religious, and ethnic groups. All other things being equal, the more powerful the social bonds among transacting partners, the more economic competition is likely to be restrained. Thus, most

transactions occur not simply in an impersonal, calculative system of autonomous actors unrestrained by social ties -- as implied by the neoclassical paradigm -- but in the context of social ties, variation in the strength of which leads to variation in levels of trust and transaction costs (Etzioni, 1988: 211; Granovetter, 1985; Streeck and Schmitter, 1985a; Hollingsworth and Boyer, 1997; Hodgson, 1988, 1999; Schneiberg and Hollingsworth, 1990).

Another form of multilateral institutional arrangement is various types of associations (cell 6). Unlike networks, clans, and communities, associations are more formal organizations. Whereas markets, corporate hierarchies, and networks tend to coordinate economic activity among different types of actors (e.g., producers with suppliers, capital with labor), associations typically coordinate actors engaged in the same or similar kinds of activities. Business associations and labor unions are some of the most common forms of associations for coordinating economic activity in capitalist economies (Schneiberg and Hollingsworth, 1990; Streeck and Schmitter, 1985a).

Finally, there is the state (cell 4), which is an institutional arrangement quite unlike any of the others. It is the state that sanctions and regulates the various non-state coordinating mechanisms, that is the ultimate enforcer of rules of the various mechanisms, that defines and enforces property rights, and that manipulates fiscal and monetary policy. Overall, it is the state that influences the total incentive system of a society (Campbell and Lindberg, 1991; Johnson, 1992: 40). At the same time, the state may also be an economic actor by engaging directly in production and exchange relations.

The choices of institutional arrangements in Figure 3 are constrained by the social context in which they are embedded. Depending on the nature of that embeddedness, there is variation in the collective forms of governance, some of which are specified in the lower part of the figure. Some modes of coordination in the bottom and upper levels of the typology are often mixed together, though one coordinating mode is likely to be more prominent than another. But actors are often engaged in complex configurations involving several kinds of institutional arrangements.

Each of these various institutional arrangements has its own logic -- its own rules, its own procedures for enforcing compliance, its own norms and ideologies which help to reduce the costs of enforcement. These are summarized in Table 1, which provides further elaboration about the various coordinating mechanisms one finds in almost every capitalist society. Table 1 lists the organizational arrangements and their structures, rules of exchange, and means of enforcing compliance associated with each type of coordinating mechanism. While each type

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Table 1 About Here

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of institutional arrangement has various positive features, each institutional arrangement also has failures, and these are featured in Table 2. It is the contest between those who support and those who oppose these various institutional arrangements that tends to lead to transformations in institutional arrangements over time (Campbell, Hollingsworth, and Lindberg, 1991; Campbell, 1997).

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Table 2 About Here

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Again, it is difficult to conceive of pure institutional arrangements -- either exclusively markets or exclusively hierarchies -- since it has been well known since Adam Smith's Wealth of Nations that the division of labor within the firm cannot be disentangled from the existence and extent of the market. Institutional arrangements have their own distinctive form of efficiency (good static efficiency for the market, dynamic efficiency for firms) and inefficiency, often leading to considerable inequality. Neither networks nor communities are panaceas for economic coordination, without being configured with other types of institutional arrangements. Networks and communities may solve certain issues, but they raise other, no less severe problems. It is important to recognize the imperfection of any single institutional arrangement in order to

comprehend the origin and transformation of any other institutional arrangement (Hodgson, 1999: Chapter three).

As suggested above, each institutional arrangement is configured with other institutional arrangements. Usually, one particular institutional arrangement is more dominant in a particular configuration, but because each type of institutional arrangement has its own strengths and weaknesses, there is no simple structural logic in the governance or coordination of a society. Each institutional arrangement constrains the other, but the inherent tension among the various institutional arrangements within a configuration contributes to changes in the governance or coordination of a society. The routines and logics of each of these configurations of institutional arrangements provide constraints and incentives for actors. The way that actors perceive the incentives and constraints of these governance configurations leads to a particular market logic, and it is the specific market logic of a society which influences its specific capacities and weaknesses. The inherent strain among the different logics in a configuration of coordination helps to provide the flexibility for a society to adapt to new circumstances.

If there were a society with pure markets or a society coordinated only by the state, there would be too much rigidity and too little diversity to cope with the vast uncertainty in the global environment. A society with very little diversity in its coordination mechanisms would have little capacity to adapt to new circumstances. Configurations with considerable diversity of institutional arrangements provide for a certain amount of incoherence in governance, but they also provide for the capacity to adapt to new circumstances. While the Soviet Union was dominated by the state as a coordinating mechanism, there were always functioning markets in the system. Moreover, the feudal society of the twelfth and thirteen centuries consisted not only of hierarchical relationship between serfs and masters but also of urban guilds, clerical hierarchies, and markets (Johnson, 1992: 38). In sum, the robustness of institutions often depends on multiple and diverse principles and logics of action, on the inconsistency of principles and procedures, on patterned forms of disorder (Lanzara, 1998; Orren and Skowronek, 1991: 320, 329).

## Third level of analysis

The next level consists of the **institutional sectors** of a society. The rules, norms, and values of a society influence the array of institutional arrangements, and both of these influence the nature of and the relationships among various institutional sectors, all of which are intricately linked together to form a social system of production. Together, all of these components influence the performance of economic sectors within a society as well as the performance of the total society. A social system of production is the way that a society's institutions (see first level of analysis above), its institutional arrangements (see second level of analysis above), and its institutional sectors are integrated into a social configuration.

An institutional sector includes all organizations in a society which supply a given service or product, along with their associated focal organizations (e.g., major suppliers, funding sources, regulators, and so forth [Scott, Meyer, and Associates, 1994: 108, 117; Campbell, Hollingsworth, and Lindberg, 1991; Hollingsworth, Schmitter, and Streeck, 1994]). Institutional sectors include but are not limited to the society's system of education, system of research, business system, financial markets, legal system and the state. The structure of the financial markets, system of training and education, industrial relations system, system of research, and state and legal systems are distinct and idiosyncratic in each society. In short, they are system specific.

All of these institutional sectors tend to cohere with each other, although they vary in the degree to which they are tightly coupled into a full-fledged system. While each of the institutional sectors has some autonomy and may have some goals that are contradictory to the goals of other institutional sectors with which it is linked, an institutional logic in each society leads institutions to coalesce into a complex social configuration (Hollingsworth, 1991). This occurs because the institutional sectors are embedded in a culture in which their logics are symbolically grounded, organizationally structured, technically and materially constrained, and politically defended. The configuration of institutional sectors usually exhibits some degree of adaptability to new challenges, but continues to evolve within an existing style. But under new

circumstances or unprecedented disturbances, these institutional configurations are exposed to sharp historical limits as to what they may or may not do (Schumpeter, 1983; David, 1988; Arthur, 1988a, 1988b; Håkanssen and Lundgren, 1997).

Why do all of these different institutions coalesce into a complex social configuration, which is labeled here as a social system of production? The literature suggests two contrasting interpretations. Part of the answer -- indeed a controversial one -- is that these institutional sectors are functionally determined by the requirements of the practice of capitalism in each time and place (Habermas, 1975). Another explanation emphasizes the genesis of the actual configuration, via a trial and error process, according to which the survival of firms, regions, or countries is the outcome of complex evolutionary mechanisms (Maynard-Smith, 1982; Nelson and Winter, 1982). However, the problem is even more complex. Markets and other mechanisms for coordinating relationships among economic actors place constraints on the means and ends of economic activity to be achieved in any society. The other coordinating mechanisms include different kinds of hierarchies, various types of networks and associations -- trade unions, employers and business associations (Hollingsworth and Lindberg, 1985; Campbell, Hollingsworth, and Lindberg, 1991). The logic of these various institutional arrangements provides actors with vocabularies and logics for pursuing their goals, for defining what is valued, and for shaping the norms and rules by which they abide (see Tables One and Two). In short, in contrast to the logic of the neoclassical paradigm, the argument here is that the dominant type of institutional arrangements places severe constraints on the definition of needs, preferences, and choices of economic actors. Whereas the neoclassical paradigm assumes that individuals and firms are sovereign, this paper is based on the assumption that firms are influenced by the hold that the institutional configurations making up a social system of production have on individual decision making (Campbell, Hollingsworth, and Lindberg, 1991; Etzioni, 1988; Streeck and Schmitter, 1985a; Hollingsworth, Schmitter, and Streeck, 1994; Hollingsworth and Boyer, 1997; Magnusson and Ottosson, 1997; North, 1990; Hodgson, 1999).

Standard neoclassical economic theory has tended to downplay the role of production and consequently of firms. Even transaction cost theorists who are concerned with analyzing the firm as a coordinating mechanism, have been relatively unconcerned with the various components of a social system of production. Indeed, as long as there was widespread optimism about the efficacy of Keynesian economics, there was relatively little concern among neoclassical economists with the supply side of the economy. Even in the opinion of most Keynesians, a group of experts should ideally be able to shape the size of aggregate demand while the supply side of the economy would be left to the two minimalist institutions of neoclassical economics -- markets and managerial hierarchies. For several decades, however, it has become increasingly obvious that some of the most competitive and successful patterns of industrial output and industrial production in capitalist economies do not derive from the neoclassical prescription of unregulated markets and corporate hierarchies complemented by a neoliberal democratic state. Indeed, it is now well understood that certain highly successful production patterns require for their emergence and survival institutional arrangements and environments the very opposite of the prescriptions found in the neoclassical paradigm (see especially Streeck, 1992, but also Hollingsworth and Streeck, 1994). Thus social scientists have come to understand that if they are to comprehend the behavior and performance of contemporary economies, concerns about social systems of production must be brought into the picture.

Because production involves more than technology, a number of social scientists have an increasing concern with social systems of production. The same equipment is frequently operated quite differently in the same sectors in different countries, even when firms are competing in the same market (Maurice, Sorge, and Warner, 1980; Sorge and Streeck, 1988; Sorge, 1989; Hollingsworth, Schmitter, and Streeck, 1994). Variations in production and process technologies are influenced, partly, by variations in the social environments in which they are embedded. In other words, firms are embedded into complex environments, which among other things, place constraints on their behavior. Thus, a social system of production is of major importance in understanding the behavior and performance of an economy. How the state and

other institutional arrangements (e.g., markets, networks, private hierarchies, associations) coalesce and are related to particular social systems of production are important determinants of economic performance.

The configurations of institutional arrangements that coordinate or govern the behavior of actors in one society and its structure of specific institutional sectors cannot easily be transferred to another society, for they are embedded into a social system of production that is societally distinct (Hollingsworth, 1997). Societies borrow selected principles of foreign management styles and work practices, but the effectiveness of such borrowing is generally limited. Economic behavior and performance are shaped by the entire social system of production in which actors are embedded and not simply by specific principles of particular management styles and work practices. Moreover, a society's social system of production tends to limit the kind of goods that it can produce and with which it can compete successfully in international markets.

Some scholars (Kenney and Florida, 1993; Oliver and Wilkinson, 1988) have assumed that the diffusion of particular forms of management styles and work practices across societies could lead to system convergence. Referring to the Japanese production system, Kenney and Florida have argued that it consists of organizational practices whose fundamental 'genetic code' can successfully be inserted into another society and begin successfully to reproduce its behavior in the new environment (1993:8). Their position is in the intellectual tradition of Antonio Gramsci (1971) who contended decades ago that the American system of mass production would most certainly diffuse to Europe over time.

However, the argument of this paper is that even though British, French, and American firms may adopt certain aspects of Japanese management styles (e.g. just-in-time production, self-managing teams, quality circles, the use of statistical process controls) or some variant of the German vocational system, their social systems of production will not converge. Moreover, the overall configuration of a society's social system of production influences its sectoral and overall national economic performance. This helps to explain why societies have different systems of innovation and why they vary in the clusters of industries in which they are highly competitive in

the international markets (Nelson, 1993, 1999; Hage and Hollingsworth, 2000; Berger and Dore, 1996).

In order to understand how and why a society's economy performs as it does, it is necessary to understand its entire social system of production. If a society is to modify substantially the performance of its institutional sectors and its entire economy, it cannot adapt only some of the management and work practices of its foreign competitors. Rather it must alter its entire social system of production. Because a society's modes of economic governance and coordination and its institutional sectors develop according to particular logics and are system specific, there are serious limitations to the extent to which a society may mimic the institutions (e.g., the rules and norms), institutional arrangements, and institutional sectors of other societies.

In the history of modern societies, there are logics by which institutions coalesce into a social system of production (Hollingsworth, 1991). Though institutions are constantly changing, there are sharp limits to the type and the direction of change that any particular institution can undergo because of its linkages with institutional arrangements and institutional sectors. Thus, a society's business firms, educational system, financial markets, industrial relations system, etc. can engage in serious restructuring only if most of the other institutional sectors also change. In social systems of production, there are pressures towards consistency in the norms, rules, and values across institutional sectors, though in any complex society, social systems are obviously imperfectly integrated. Indeed, the degree to which the institutional norms and rules making up a social system of production are loosely or tightly coupled is a variable of considerable importance. In general, the institutional sectors making up a social system of production are interdependent, and changes in one generally result in changes in the others. Since each institutional level is dependent on the others for various types of resources, there is interdependence among the differing institutional spheres. Moreover, each society has its norms, moral principles, rules and laws, recipes for action, as well as its own idiosyncratic customs, traditions, and principles of justice (Burns and Flam, 1987).

There are also other inherent obstacles to convergence among social systems of production, for where a system is at any one point in time is influenced by its initial state. Systems with quite different initial states are unlikely to converge with one another's institutional practices. Existing institutional arrangements block certain institutional innovations and facilitate others (Roland, 1990). Thus, the institutions making up a social system of production provide continuity, even though institutional arrangements are always changing, but with a particular logic. While Williamson (1975, 1985) suggests that actors tend to choose the institutional arrangements which are most efficient, North (1990) is much closer to the mark in his argument that most societal institutional arrangements exist as a result of custom and habit and are therefore inefficient. At any moment in time, the world often appears to its actors as very complex and uncertain. For this reason, actors often engage in contradictory forms of behavior pursuing different strategies as hedges against a very uncertain world (Lanzara, 1998). And their hedging and contradictory forms of behavior may lead in somewhat different societal directions, all constrained by the institutional fabric within which the actors are embedded. This kind of contradictory behavior occurs in part because of the contradictions inherent in the dominant configurations of institutional arrangements with their contradictory logics (see discussion of level two above).

Despite the emphasis on the logic of institutional continuity, this is not an argument that systems change along some pre-determined path. There are critical turning points in the history of highly industrialized societies, but with the choices limited by the existing institutional terrain. Being path dependent, a social system of production continues along a particular logic until or unless a fundamental societal crisis intervenes (Milgrom, Qian, and Roberts, 1991; Krugman, 1991; Durlauf, 1991; Hollingsworth, 1991; Pred, 1966; David, 1988; Hodgson, 1998).

At this point it is important to confront the question of how social systems of production evolve. And this question gets to the heart of the problem of building complex societal structures. Certainly, social systems of production did not emerge from some process of social engineering. Moreover, the various component parts of each social system of production have

often not been designed to be part of a social system of production. The component parts of each social system of production have emerged more often than not as unintended by-products of goals which various actors had in mind at earlier moments in time. It is usually the case that actors at time ‘t’ fail to comprehend the long-term consequences of their actions. Wolfgang Streeck, the author of several brilliant papers on social systems of production, argues that institutional sector designs created for one purpose generally address that goal, but over time those designs had quite unintended consequences (Streeck, 1997a, 1997b; Wright, 1998). Describing the configuration of the German social system of production of the 1970's and 1980's, Streeck points out that it was the unintended by-product of multiple points in history. Some elements were pre-Wilhelmian, others were introduced by the Allied powers after 1945, and others emerged during the years of the German Federal Republic. All component parts of the German social system of production ‘were and continue to be changing, for their own reasons, as well as in reaction to each other, and certainly there can be no presumption of a pre-established fit between them, even though one might want to allow for some reinforcement effects of the model’s historically contingent, social and economic success’ (Streeck, 1997b: 54). In sum, the emergence of social systems of production is a long-term, evolutionary process with each part interacting with its environment and resulting in a configurative whole but with no previous design by either a single actor or a collectivity of actors. As suggested above, actors do not re-create their world anew. At any moment in history the total institutional complex of a society necessarily contains the resources and legacies of its past. Pre-existing institutional complexes are never completely wiped out. Societies consist of multiple layers of history with their diverse logics of action. However, the cumulative effect of small, peripheral changes in altering particular institutional sectors and institutional arrangements can be substantial (Murmann, 1998; Lanzara, 1998). ‘Institution building is affected more by the ways in which people have codified the past than by how they envision the future. There are many more potential resources in pre-existing institutional arrangements than it is usually assumed or suspected’ (Lanzara, 1998: 30).

## Fourth level of analysis

The next level of institutional analysis, **organizational structures**, is somewhat more controversial. As suggested above, Douglass North (1990) draws a sharp distinction between institutions and organizations. More recently, many organizational theorists (Powell, 1991; Powell and DiMaggio, 1991; DiMaggio and Powell, 1983; Baum and Oliver, 1992; Kondra and Hinings, 1998; Townley, 1997) argue that institutional rules, norms, and conventions unfold in tandem with organizational structures, and this is my position.

The literature which focuses on how institutions influence organizations is quite different from two other theoretical literatures which also are concerned with how organizational environments shape the behavior of organizations. There are resource dependency theorists (Pfeffer and Salancik, 1978) which emphasize the role of environmental resources in shaping organizations, while Hannan and Freeman (1977, 1984) and other population ecologists emphasize the survival of organizations, given certain kinds of organizational conditions (Orru, et al., 1991).

The institutionalist perspective, as implied above, emphasizes the normative environment in which organizations are embedded. It is a perspective which focuses on the way in which organizations, in their behavior, tend to conform to the institutional rules and norms which are dominant in the organizational environment. However, all three perspectives -- the institutionalist, the population ecology, and the resource dependency -- emphasize how the environment influences organizations and how organizations which are subject to the same environment tend to converge in their behavior, to have what DiMaggio and Powell have labeled organizational isomorphism (DiMaggio and Powell, 1983).

There has emerged a vast literature which demonstrates that within each society there are fiscal, political, judicial, and other regulatory norms which limit and shape the culture and structure of organizational behavior. The normative institutional environment of organizations limits the options of what organizations do in a particular society and influences the patterns of ownership, relations with suppliers, and customers. In short, it is the normative environment of

organizations which defines within a particular society what is socially acceptable behavior for organizations (Hamilton and Biggart, 1988; Hollingsworth and Hollingsworth, 2000; Meyer and Rowan, 1991; Zucker, 1987, 1988, Orru, et al., 1991; Townley, 1997).

Thus far, most of the analyses on isomorphic pressures operating on organizations have been cross-sectional in nature. However, the entire concept of isomorphism implies that there are strong environmental pressures exerted on organizations, and in order to observe this phenomenon, it is important that we have longitudinal studies which assess how changes in an organization's institutional environment influence changes in the structure and culture of organizations. Moreover, the expectation here is that when one analyzes the patterns of organizational change over time, the isomorphism will be holistic -- that is within a particular society there will be a tendency for the internal structure of particular types of organizations to converge, due in large part because of the pressures to conform to the changes in the external norms, rules and values. A close reading of Aoki (1990) and Slack and Hinings (1994) finds that changes in the national institutional environment of organizations has influenced changes in the internal structure of organizations within a specific industry of a particular society.

However, it is inappropriate to view organizations as changing only in relation to exogenous environmental change. There is a kind of coevolution which occurs between organizations and their institutional environments. Coevolution implies nonlinear feedback between organizations and their institutional environments. This is of course quite different from the more common way of studying organizations by modeling relations between independent and dependent variables. Of course, the more common type of analysis is quite appropriate when there are simple relationships which do not involve complex feedback processes. But in the strategy for institutional analysis which is proposed herein, it is less useful to separate independent from dependent variables and more useful to understand the interacting and coevolutionary processes among all of the levels of institutional analysis discussed in the various sections above (Baum and Singh, 1994a: 379-80; Mowery and Nelson, 1999; Murmann, 1998).

The logic of the perspective herein suggests that within every society, there is variation in the structure and culture of business firms, universities, and other complex organizations (Kondra and Hinings, 1998). However, this variation takes place within parameters which are system specific. For example, every German firm and every German university is different from that of every other German university and firm, but there are a set of cultural and structural characteristics which distinguish German firms and universities from those in America. Similarly, each Japanese firm and university is unique, yet they have a set of cultural and structural characteristics which are system specific and which differentiate them from business firms and universities in other countries.

In all societies, each organization has its own distinctive organizational rules, norms, and conventions which are subordinate to the meta norms and rules of the larger society within which they are embedded. However, the strength of the institutional environment within which organizations are embedded varies from society to society. Some societies have multiple institutional environments and there is heterogeneity in terms of what constitutes appropriate behavior of organizations. In such societies, there can be conflict over the what institutional logics should regulate specific organizational functions (Friedland and Alford, 1991; Townley, 1997: 262-63). In those societies in which the institutional norms, habits, rules are most developed and in which the institutional pressures to conform are greatest, there is less variation in the structure and culture of business firms and various kinds of research organizations. In such societies, the connectedness between research organizations and their institutional environments are sufficiently strong so that organizations have low autonomy to pursue independent strategies and goals, and in these societies there is a great deal of organizational isomorphism. Conversely, the weaker the institutional environment in which research organizations are embedded, the greater the variation in the structure and culture of business firms and research organizations. Moreover, where the institutional environments are more weakly developed, organizations have greater autonomy and flexibility to respond to the development of new knowledge and to be highly innovative. Hence, it is in those societies where the institutional environments are most

developed and are most rigid where there is less organizational autonomy and flexibility and where there have been fewer radical innovations in basic and applied science as well as in totally new products and industrial sectors.

**Fifth level of analysis**

We come next to the **outputs and performance** of the various institutional components of a society. It is at this level that institutional components are more pragmatic and flexible. For example, in the legal sector, there are specific statutes and court rulings; in the state sector, there are specific policies; in the business sector, there are new products, new technologies, and market strategies. It is at this final level of analysis where institutional spheres are most open and susceptible to change, and cross-national mimicry is easiest and most common.

Through the outputs of the society we can obtain some assessment as to how well a society is performing. Moreover, we can assess how innovative it is, how egalitarian it is in the distribution of its resources, how egalitarian it is in terms of levels of health, education, etc. Just as it is complicated to measure how egalitarian a society is, similarly it is difficult to assess how innovative it is. For example, societies vary in making incremental and radical breakthroughs in basic and applied science; in developing totally new products and new kinds of organizations; in incremental and process innovations in existing products and organizations; in developing new and different forms of marketing -- both domestically and globally (Hage and Hollingsworth, 2000). Of course, societies vary in their rates of economic growth, in their rates of economic productivity, in their quality of life (e.g., rates of crime, life expectancy, etc.). All of these performance criteria feedback and influence each of the levels of institutional analysis discussed above -- rules, norms, values, etc; institutional arrangements, institutional sectors; the structure and form of organizations. Moreover, performance measures may influence each other. For example, if a society has very low rates of growth, it may not be very innovative in some of the types of innovative activities mentioned above. Good or poor performances of certain kinds influence other performance indicators (Hollingsworth, Hage, and Hanneman, 1990).

Different institutional arrangements and different social systems of production result in different types of economic performance. Hence, so long as societies have different social systems of production, there are serious constraints on the degree to which they can converge in their innovative styles. Different social systems of production tend to maximize in a more or less explicit manner different performance criteria, usually mixing considerations about static and dynamic efficiency, profit, security, social peace, and economic and/or political power. In short, in contrast to the implications of neoclassical economic theory, in real world economies there are no universal standards all economically rational actors attempt to maximize. Economic history provides numerous examples of how a great variety of principles of rationality are implemented in different societies.

A critical question in institutional analysis is whether an existing social system of production which supports a set of routines for a particular kind of technology and industry can shift from old practices to new ones. There are numerous historical accounts of how the social system of production in a particular society which worked so well for a number of years could not adapt to new technologies (Lazonick, 1990; Veblen, 1915; Nelson, 1994). Schumpeter (1983) and Freeman (1991) have developed the idea of a techno-economic paradigm which suggests that different technologies require specific forms of organizational arrangements -- or what I called social systems of production. Because of 'institutional inertia', the social system of production of a society may not be able to adapt to a new techno-economic paradigm (Nelson, 1994: 58; Lanzara, 1998).

Whether a social system of production can sustain its performance standards depends not only on its intrinsic economic rationality, but also on where it fits into a larger system. If a particular social system of production is immune from the innovativeness and competition of an alternative system, survival can be long lasting. But if different social systems of production, with diverging criteria of good economic performance, meet in the world arena, the arbitrariness of nationally imposed constructed performance standards may be superseded by alternative performance criteria as a result of international competitiveness.

The world economy is also socially constructed, just as are national economies. Even if different social systems of production are competing in the international arena, it is not always possible to determine which is more competitively effective at any moment in time. Hegemonic nation-states in *the short run*, shape the rules of trade to favor their industrial sectors and firms. But the history of hegemonic powers suggest that in the longer run, such social systems of production, sustained largely by military and political power, eventually give way to more innovative and competitive social systems of production. In our own day, as nation-states are increasingly integrated into a world economy, even hegemonic powers lose their innovative and competitive advantage, and their share of world output decreases. Such a country may attempt to restructure its institutional arrangements and to readjust its performance preferences. But to restructure its system of innovation generally calls for a major redistribution of power within a society. Largely for this reason, societies have historically had limited capacity to reconstruct a system of innovation in the image of their major competitors. Each country's social system of production is a configuration of a host of norms, rules, and values as well as of institutional arrangements. Each system is constantly changing and is open to influence from other systems. And indeed many technologies and practices diffuse from one society to another, but a society's capacity to be innovative is constrained by the existing social system of production. Thus the same technology may exist in numerous countries, but how it is employed and how it influences societal outcomes and performances varies from one institutional configuration or society to another (Hollingsworth, 1998).

## PERSPECTIVES ON INSTITUTIONAL CHANGE

A fundamental problem which remains unresolved in institutional analysis involves the nature of institutional change. There is much confusion and miscommunication in the social sciences about institutional change, in large part because we do not even know how to measure the rate of institutional change. Of course we know that there are both external and internal focuses for change, and we have had a good bit of scholarship on this subject. What is not clearly understood is that institutions and institutional arrangements within societies are historically

rooted, that there is a great deal of path dependency to the way that institutions evolve. Moreover, the more intricately linked each sector is with each other sector and with a society's rules and norms, the less choice actors have to devise new institutions and institutional arrangements. On the other hand if a sector or actor is too isolated, it may be too weak within a society to bring about any kind of effective change. These considerations are very critical to the problem of how much freedom actors have to create new institutions afresh, to what extent institutions diffuse from one society to another (Murmann, 1998; Lanzara, 1998). This is a fundamental question for students of institutional analysis, as we attempt to understand how the different institutional levels are linked together.

There are a variety of reasons why there is confusion in studying institutional change. There is disagreement over the extent to which actors have the freedom to build new institutions arrangements, and if they do, to what extent may the new arrangements and organizational patterns depart from past practices. Among some institutional economists (Williamson, 1985), there is a basic assumption that actors build efficient institutions by pursuing their self interest and by promoting their strategic goals. Moreover, there is the assumption that a mixing of full rationality with market competition tends to produce all of the optimal institutions that are needed in order to coordinate a complex capitalist economy (Hollingsworth and Boyer, 1997; chapter 14; Hodgson, 1999). In contrast, the argument developed here is much more complex.

Social institutions are historically rooted, and there is a great deal of path dependency in the way that various institutional components evolve. The shape of institutional configurations at any moment limits the type of options for change. Because there is a great deal of institutional inertia, radical change in the institutional components of a society is uncommon (Lanzara, 1998). Recognizing the constraints existing institutions exert on actors, we note that existing configurations of institutional arrangements, institutional sectors, and organizational properties can limit but also influence the degree to which norms and rules can change. Many scholars (North, 1990; Ostrom 1990, 1991) have emphasized the role of norms, rules, ideologies, and values in limiting the ability of actors to develop new institutional arrangements which radically

depart from existing ones. However, there is a two way process of interaction, a process of co-evolution (Baum and Singh, 1994a; Nelson, 1994). Thus as Friedland and Alford (1991:24 4) argue, actors develop new institutional arrangements by recognizing organizational failures and low performance, but these new arrangements do not necessarily change a society's norms, rules, habits, and its underlying value system.

Campbell (1997) advances our understanding of how existing institutions enable actors to construct radically new institutions. He recognizes that most institutions and institutional arrangements embody a degree of inertia from which it is difficult for actors to depart. Moreover, the differential power relations among actors make it unlikely that less powerful actors can change the existing power structure of a society. Most change in the institutional components of a society evolves through a process of constrained selection which reflects to a considerable degree the existing arrangements, and power relations. This becomes the interpretive frame for social actors, with institutionalized scripts and rituals which tend to be taken for granted and appear to be quite ordinary and natural. This institutionalized scripting of the social world is an extremely important source of social stability and inertia.

Campbell has developed a very fruitful explanation of change in terms of the various institutional components outlined here. He distinguishes between incremental and radical institutional change and argues that radical institutional change occurs when social actors with widely differing norms, cultural scripts, and rituals for action engage in intense interaction with each other (see also Knight, 1992). The more diverse the interactions, the greater the potential for institutional change. He argues that as shifts in the composition of interaction among social actors occur, changes in the interpretation of problems and interests will follow. If there are only minor changes in the extent to which diverse actors interact, there will be only modest institutional change. But the more fundamental the changes in the interaction of diverse social actors, the greater the change in the way that actors interpret their world. And the greater the change in the way that actors interpret their world, the more likely that radical changes in various institutional components will follow. In other words, diverse decision making tends to create a

wider range of interpretive frameworks of the social world than is likely to be the case if social actors operate in isolation.

This perspective of diverse interactions among social actors facilitates our ability to move beyond the traditional view that existing institutions constrain the range of institutional alternatives which actors face. The older view has tended to suggest that actors engage in institutional change by extending existing institutional principles, habits, and conventions. Specifying the conditions which facilitate fundamental institutional change permits a much richer perspective for institutional analysis. Campbell's perspective about the conditions under which fundamental or radical change in institutional components occurs is consistent with my own research about the conditions under which major discoveries or fundamental new knowledge occurs: the more scholars with diverse backgrounds interact with intensity and frequency, the greater the likelihood that they will develop new and alternative ways of thinking (Hollingsworth and Hollingsworth, 2000).

These views of institutional change are also consistent with the recent work of Nelson and his colleagues (Mowery and Nelson, 1999: Murmann, 1998). They report the research on a variety of industrial sectors in a number of different countries, revealing that networks of actors in particular industries, business and professional associations, university research departments and institutes, professional associations are frequently able to use their collective power to modify a society's property rights, research system, governmental policies. It is the intense and frequent interaction of these diverse, complex sets of actors -- sometimes constituting a technology system -- that often leads to incremental changes in a society's total social system of production. It is this kind of collective action that brings about organizational change, change in institutional sectors, institutional arrangements, and even in the rules and norms of a society. And if we are to understand how the style of innovativeness of a society changes, we must first understand the changes in its institutional makeup. It is highly unlikely that a society will develop a new style of innovativeness without changing its institutional structure.

## FIRMS, THEIR INSTITUTIONAL ENVIRONMENT, AND NATIONAL SYSTEMS OF INNOVATION

Variation in innovative style of societies is shaped by their institutional makeup -- the various levels which are discussed above: institutions, institutional arrangements, the structure and cohesion of institutional sectors which constitute a society's social system of production; and the structure and culture of its organizations -- especially its business firms and other research organizations. By undertaking an institutional analysis of a society, one can then begin to understand in what kinds of organizations the production of specific kinds of knowledge takes place and how this is linked to particular kinds of innovativeness. With such a perspective, one can gain a rich understanding of why some societies excel in the production of radical breakthroughs in basic and applied science and in developing radically new products and why other societies excel in more incremental innovations.

Reflecting on these issues, one cannot help being impressed with the contrasts between the innovative styles of German and American organizations. For example, Germany has continued to be very successful in making incremental innovations in many industries in which it was very competitive well before World War II: paper, printing, materials, machinery, electrotechnical products, motor vehicles, chemicals, textile yarns and fabrics. But the Germans have been much less successful in developing totally new products or related innovations in biotechnology, electronics, telecommunications, aircraft, as well as other newer industrial areas. In contrast, the Americans have been very innovative in these and other industries with products having very short lives and technologies which change very rapidly and are very complex (Hollingsworth, 1991; Soskice, 1997, 1999).

The importance of institutions and innovativeness for international competitiveness has led to the recognition that there are national systems of innovation ( Lundvall, 1992; Nelson, 1993; Edquist, 1997; Hage and Hollingsworth, 2000). But even before the recent studies of national systems of innovation, Landes (1969) was a proponent of these views when he made the argument that Germany had developed a national system of innovation by building on its

education and scientific research systems which were lacking in Britain and elsewhere. However, the concept of a national system of innovation immediately poses the problem of what kind of innovations should be considered?

David Soskice, an economist at the Wissenschaftszentrum Berlin, has addressed a set of problems somewhat complementary to the perspective raised herein. His work (Soskice, 1990, 1997, 1999) suggests that we be sensitive to the institutional environment in which the following actors are embedded: the employees of firms, the owners and financiers of firms, the competitors of firms, and finally, their collaborators -- a perspective complementary to Hollingsworth's work on social systems of production (Hollingsworth, 1997, 1998). When one reflects on the institutional context/social system of production within which these actors are embedded, one becomes aware that those countries which have somewhat inflexible labor markets external to firms, but a business system in which firms have long term commitments to their employees are strongly associated with incremental but hardly at all with radical innovations. In the firms of such countries (e.g., Germany and Japan), there is much more consensus decision making than in societies where a 'hire and fire' set of practices are quite pervasive. And this kind of consensus decision making -- while highly conducive to incremental innovativeness -- limits the capacity for radical innovations to occur. This kind of 'long termism' set of norms and rules occurs not only in the employment practices of incrementally innovative firms, but also in their financing and ownership patterns (Hollingsworth, 1997). During the past thirty years, these were characteristics of many firms in Germany and Japan. Significantly, in both of these countries, venture capital markets were not highly developed, financing tended to be based more on long term bank loans than from the equity markets, and the relationship of firms tended to be relatively stable. And these stable institutional arrangements also contributed to a high degree of innovativeness -- but incremental rather than radical innovations.

Meantime, we should also pursue Soskice's ideas (1999) about how firms' relationships with their competitors and collaborators shape their styles of innovativeness. In those advanced industrial societies in which business firms are highly mobilized into business associations, there

tends to be a high degree of standardized quality controls over technical norms and a high degree of reliance on legal sanctions as monitoring instruments vis-a-vis association members. As a result of this high degree of integration of firms into associations, member firms are more likely to be associated with incremental innovations than is likely to be the case with firms in those societies where associations are less well developed. In the latter type of society, radical innovations are more likely to occur. In those advanced industrial societies where firms have long term stable relationships with collaborators in product design and production, the style of innovation is likely to be incremental. And it is in those societies in which there is a weaker tradition of strong collaboration among firms that radical innovations are more likely to occur.

Obviously, even in a country where there may be a great deal of radical innovativeness, most innovations will be of an incremental type, for there are simply fewer radical innovations. But Germany and Europe not only have had relatively few radical innovations in comparison with the United States, but they also have lagged behind the US in developing relatively totally new industries. Thus, there has been much less innovative activity in Europe in high technology and newly emerging industries than in the U.S.A.

In complementary research Audretsch and Feldman (1995) have demonstrated that the U.S. has been more successful in spawning firms engaged in the early stages of the industry life cycle, but relative to Germany had an environment unfavorable to innovative activity by established firms, especially in more mature industries. German firms have tended to be associated with a routinized technological regime -- where established enterprises have had strong advantages to engage in incremental innovations but new firms have tended to have fundamental innovative disadvantages relative to the Americans (see Audretsch, 1995; Winter, 1982; Casper, 2000).

On both sides of the Atlantic, universities engage in basic and applied research. But significantly, the institutional environment in which universities are embedded influences the degree to which the research is likely to represent major breakthroughs or is likely to have more modest implications. Recent research in biomedical science demonstrates that those societies in

which university professors and/or graduate students have the following characteristics, there are likely to be very relatively major research breakthroughs: graduate students have a long training period, high dependency on a major professor, low autonomy in defining the nature of a research project, restricted job options, and an university environment where there is a very modest or absence of entrepreneurial culture. For example, in Germany -- a country with relatively few radical breakthroughs -- the scholar who finishes a habilitation will have spent many years on a research project before qualifying for a permanent academic position, will have been in a high dependency position with a senior professor, will have had limited autonomy to define a research project, and will be constrained from pursuing a high risk research project. The young German will have an extraordinarily high level of training but will have faced a number of disincentives to undertake high risk research. And as soon as he/she has completed the habilitation and becomes a professor, administrative responsibilities constitute another disincentive from engaging in high risk or long term research projects. Moreover, the German professor is a civil servant with a more stable and secure income than his/her American counterpart. In a very different institutional environment, American professors in large research universities tend to become much more entrepreneurial. Today many American professors behave as though they are operating their own firms within universities, and thus devote considerable time to generating funds for research projects, assistants, secretaries, supplies, etc. And the variation in this entrepreneurial spirit across countries is associated with variation in the taking of high risk research strategies and the making of major research breakthroughs.

In sum, societies vary in terms of the institutional environment in which their organizations are embedded, and this variation influences the degree to which they have industrial activities in the early or late stages of the industry life cycle, successfully new or mature industries, and radical vs. incremental innovations. And it is this variation which is encouraging firms in countries with relatively few new industries and with few or no radical innovations to invest in those countries with many new industries and numerous radical

innovations -- as a strategy to be able to transfer new technologies from the latter institutional environment to the former.

Table 3 summarizes the way that the norms rules and values of a society are associated with America's and Germany's institutional arrangements, their social system of production, and their styles of innovativeness.

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Table 3 About Here

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## CONCLUSION

Several themes deserve to be re-emphasized. Most importantly, institutional analysis is emerging as a dominant issue in several social science disciplines. The study of various institutional components discussed above is a complex subject requiring multiple levels of analysis and a knowledge of multiple sectors within societies. It requires a theoretical perspective that evolves from an empirical analysis in different societies. If we are to advance the study of institutional analysis, we need cross-disciplinary collaboration and team research, not readily achieved, given the structure of most of our research universities.

At present, scholars in each academic discipline have their own distinctive strategies for studying institutional analysis. Thus, economists tend to use several approaches (North, 1990, Williamson, 1985; Hodgson, 1988, 1998, 1999); anthropologists another (Geertz, 1995), and sociologists, political scientists, and historians employ other strategies (Campbell, Hollingsworth, and Lindberg, 1991; Powell and DiMaggio, 1991; Katznelson, 1998; Hall and Taylor, 1996). With practitioners in various disciplines pursuing their distinctive approaches to institutional analysis, there is low potential for collaborative institutional analysis across the social sciences. The lessons from the biological sciences over the last 40 years are very instructive: once practitioners from various biological disciplines began to cooperate in studying biological phenomena by using the same concepts at the molecular level, theoretical advance was very rapid. Comparable phenomena took place in the development of other hybrid fields, e.g.,

biochemistry, biophysics (Judson, 1979; Olby, 1979; Kohler, 1982, 1994). Similarly, were social scientists in various disciplines to work collaboratively in the area of institutional analysis, there would very likely be an acceleration in their theoretical knowledge.

This is not a plea that everyone engaged in institutional analysis should do the same kind of research. Indeed, just as biologists working at the molecular level study many different kinds of problems, similarly social scientists engaged in institutional analysis would also work on many separate problems, but in the spirit of a collective enterprise. Some would concentrate their attention on the study of rules, norms, habits, conventions, and values, while others would study how these are associated with configurations of various institutional arrangements (types of markets, hierarchies, networks, associations, communities, clans, states, etc.). Others would work on specific institutional sectors (e.g., education, business systems, financial markets, and systems of research). Distinctive would be the recognition of how these separate studies are linked together, how each institutional sector is linked to a society's norms, rules, values, etc. and its configuration of institutional arrangements. Similarly, other institutional analysts might focus on the study of organizations, with a major concern for how the institutional environment of organizations (e.g., norms, rules, values; configurations of institutional arrangements; institutional sectors) influenced the structure, culture, and outcomes of organizations. And finally, others might study how all of the aforementioned aspects of institutional analysis influenced a society's overall performance. Nelson and Sampat (1998) have appropriately reminded us that we should engage in institutional analysis in order to address specific problems, but the view developed in this paper is that we first need some mapping of the terrain of institutional analysis in order for our diverse enterprises to become a meaningful collective enterprise, especially if we are to understand how institutions influence the innovative process.

**The argument developed herein is not that all social scientists should engage in institutional analysis.** Obviously, there are numerous other important areas of research which lie beyond the field of institutional analysis. Nor does this paper argue that institutional analysis is the most important subject for social scientists.

Since the structure and culture of our research universities reflect an enormous amount of disciplinary fragmentation, what are the prospects for promoting the kind of collective and interdisciplinary research agenda proposed above? In one respect the prospects are not encouraging. During the past half century, the efforts of American universities to have effective communication across the biological sciences have varied greatly in success. At the University of California-Berkeley, it was not until the 1980s that there was a serious effort to integrate the biological sciences, and at that time, the campus abolished seventeen departments to promote an integrated biological program. But at the University of Wisconsin, the biological sciences are still very fragmented into dozens of different departments in botany, plant pathology, zoology, physiology, with two departments of biochemistry, and two departments of genetics.

There have been other approaches which have worked very well historically for promoting scientific integration amidst scientific diversity. For example, several summer schools and special institutes were organized in the United States during the 1940s in an effort to overcome the fragmentation in the biological sciences. These programs made it possible for scientists in diverse academic disciplines and from different universities and countries to come together to engage in intense and frequent interaction. Perhaps, the most effective program was that which was held in the summers at Cold Spring Harbor, New York where a research agenda for the study of molecular biology was developed (Fischer and Lipson, 1988; Stent and Watson, 1966). Scientists went there summer after summer, and when they returned to their universities, many began the restructuring of the biological sciences in their universities.

In our own day, we need summer institutes and other similar programs so that scholars from diverse backgrounds can come together and develop a collective agenda for doing institutional analysis and for studying the impact of institutions on the performance of societies -- innovativeness being one such subject. If we can develop such institutes, we increase the prospects of transforming our universities. There is reason to be optimistic that once an eclectic group of scholars work with a common set of concepts, we can have genuine theoretical advance if researchers can bring their diverse expertise to bear on a common set of problems. There is

considerable evidence that institutional analysis offers high potential for advancing our knowledge of innovations and technological change (Hollingsworth and Hollingsworth, 2000). If we are going to make substantial theoretical advance, it is not likely to occur from the vantage point of a multiplicity of disciplines. Rather, it is likely to occur as we develop a new intellectual framework and our own academic journals. This is a tall agenda which requires us to reassess the way that knowledge is presently produced in our societies.

*Note

This paper is part of a much larger agenda involving the study of institutions, organizations, and innovations in which I am involved. My debts are many and varied. The first version was written while in residence in the Research Unit for Institutional Change and European Integration of the Austrian Academy of Sciences in Vienna in the summer of 1998. I am especially grateful to Professors Egon Matzner and Sonja Puntscher-Riekmann for providing the stimulating environment in which to think through the ideas developed herein. Egon Matzner has engaged in very stimulating discussions with me about the importance of institutions in the general field of socio-economics. The final version of the paper was completed while in residence as a fellow at the Neurosciences Institute in La Jolla, California. I also wish to thank my colleagues in the Innovation Theme Project at the Netherlands Institute for Advanced Study (NIAS) during 1998-1999 and Edgar Grande and Karl Müller for stimulating conversations about the interaction of institutions and organizations in facilitating particular types of innovation. I am especially grateful to Jerald Hage for helping me to develop a number of issues in the paper and for his useful comments on the first draft. Frans van Waarden early on helped me to work through the idea of multiple levels of institutional analysis. Others who have helped to develop the ideas in the paper have been my colleagues in the research project 'Comparative Social Systems of Production,' especially Tom Burns, Christel Lane, Yoshitaka Okada, Wolfgang Streeck, and Richard Whitley. My colleagues Robert Boyer, Steve Casper, and David Soskice have taught me much about how incentives provided by the institutional environments of firms influence individual decision making. But my most important debt is to Ellen Jane Hollingsworth who has repeatedly questioned every single assumption of this paper. Without her rich and continuous tutoring, this paper would be even less developed than it is at present. Finally, without the insightful assistance of David Gear in many phases of this paper, it would not have been completed.

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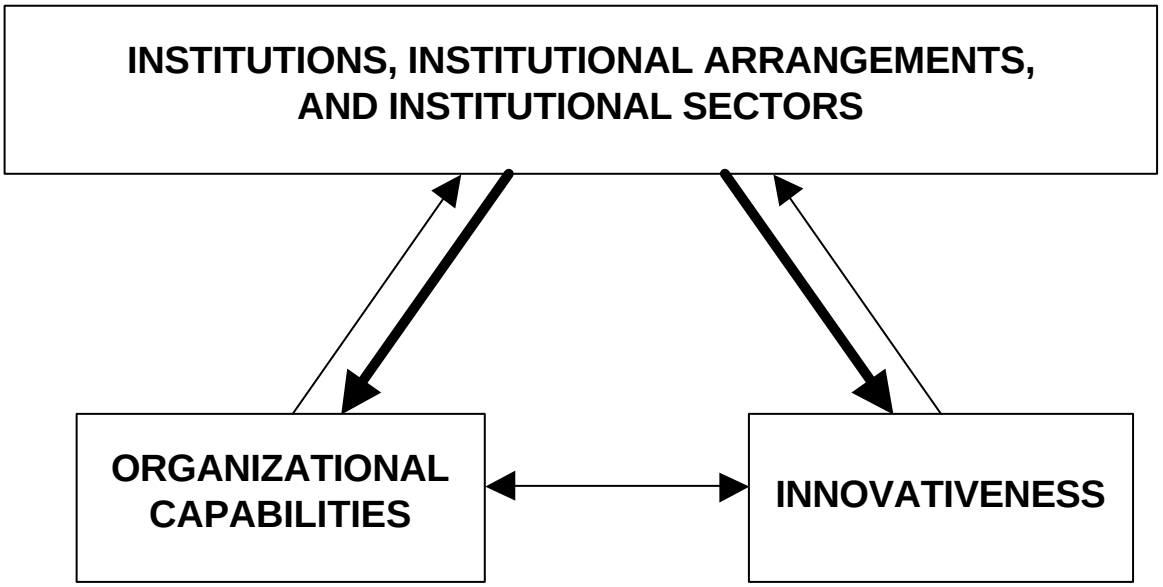
**Figure 1**

**Institutional Environments, Organizations, And Innovativeness**



## Figure 2

### Components of Institutional Analysis *

1. **Institutions** = Norms, Rules, Conventions, Habits, and Values (see North, 1990; Burns and Flam, 1987).

2. **Institutional Arrangements** = Markets, States, Corporate Hierarchies, Networks, Associations, Communities (Hollingsworth and Lindberg, 1985; Campbell, Hollingsworth, and Lindberg, 1991; Hollingsworth, Schmitter, and Streeck, 1994; Hollingsworth and Boyer, 1997).

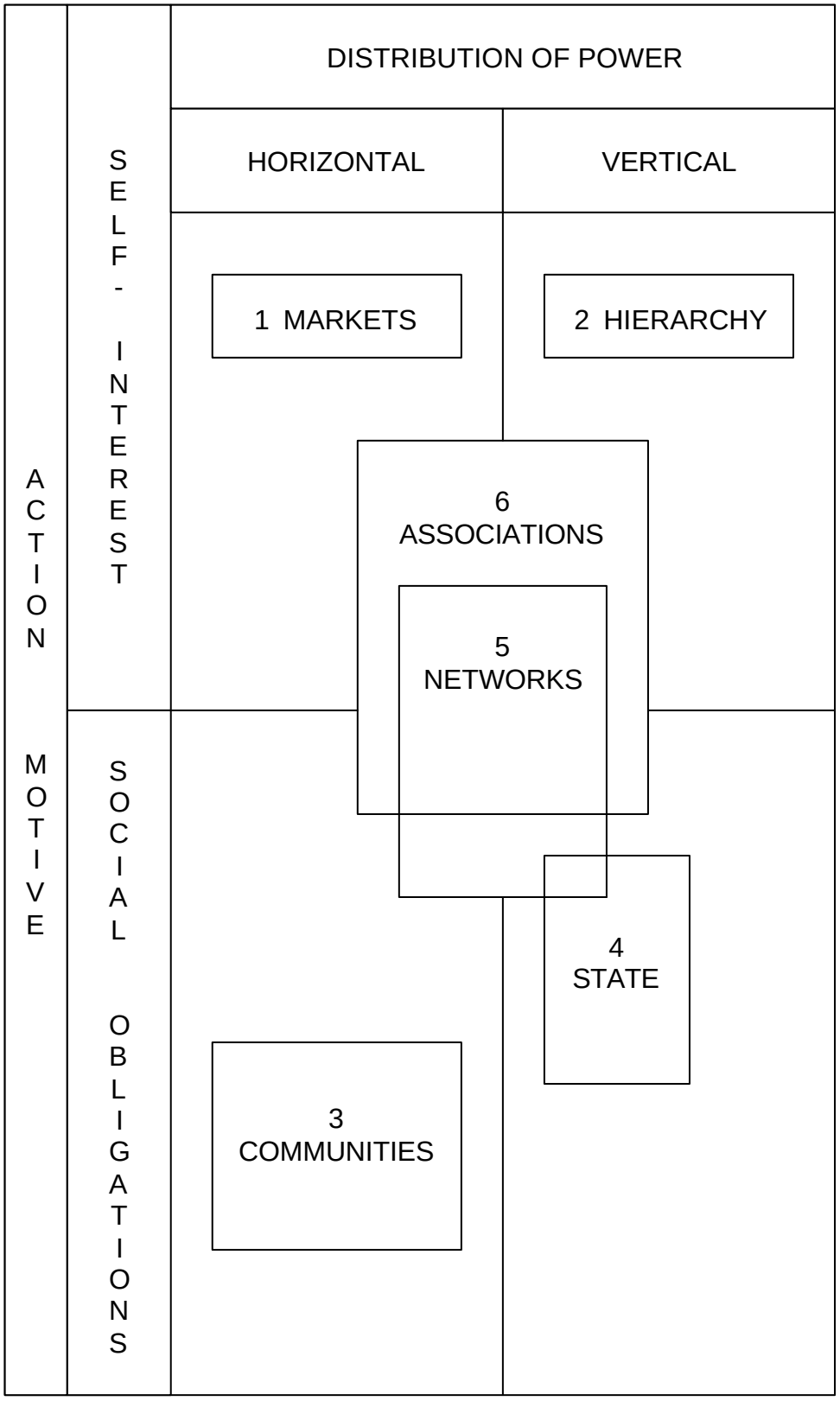
3. **Institutional Sectors** = Financial System, System of Education, Business System, System of Research (Hollingsworth, 1997).

4. **Organizations** (Powell and DiMaggio, 1991).

5. **Outputs and Performance** = Statutes; Administrative Decisions, the Nature, Quantity and the Quality of Industrial Products (Hollingsworth, 1991, 1997); Sectoral and Societal Performance (Hollingsworth and Streeck, 1994; Hollingsworth, Hage, and Hanneman, 1990; Hollingsworth and Hanneman, 1982).

* The five components in this table are arranged in descending order of permanence and stability. That is, norms, conventions, etc. are more enduring and persistent than each of the other components of institutional analysis. Each component is interrelated with every other component, and changes in one are highly likely to have some effect in bringing about change in each of the other components.

**Figure 3 A General Taxonomy of Institutional Arrangements**



## Table 1

## Logics of Institutional Arrangements

| Coordination mechanisms | Organizational structure | Rules of exchange | Individual means of compliance | Collective means of compliance |
|---|---|---|---|---|
| Markets | Easy entry and exit<br><br>Bilateral exchange or market site (Wall Street) | Voluntary spot exchange | Legal enforcement of control<br><br>Regulations to enforce contracts | Norm of private property<br><br>Legitimacy of market mentality |
| Communities | Informal membership evolves over long period of time | Voluntary exchange based on social solidarity and high degree of trust | Social norms and moral principles impose obligations<br><br>Knowledge of others and reciprocity over time | Highly institutionalized norms and rules require members to accept ? corporate´ obligations |
| Networks | Semiformal membership<br><br>Bilateral or multilateral exchange | Voluntary exchange over a time period | Contractual bonds<br><br>Resource dependence | Personal relations<br><br>Trust built outside the economic arena |
| Associations | Formal membership<br><br>Multilateral exchange | Restricted to members<br><br>Emphasis on insider/outsider or we/they mentality | Self-interest<br><br>Reputation effects | Some degree of compulsion<br><br>Private interest type of governance |
| Private hierarchies | Complex organizations which tend to become bureaucratic | Restricted to members, exchange based on asymmetric power, bureaucratic rules | Rewards to individuals<br><br>Asymmetric power, threat of sanctions | Highly institutionalized rules<br><br>Members socialized into corporate culture, use of sanctions |
| State | Public hierarchy<br><br>De jure and imposed membership | Unilateral action<br><br>Indirect political and economic exchange | Exit, voice, (vote, lobbying), loyalty | Coercion<br><br>Norms and public rules |

**Table 2**

**Failures of Coordinating Mechanisms**

| | Coordinating mechanisms | | | | | |
|---|---|---|---|---|---|---|
| Type of failure | Associations | Private hierarchies | State | Market | Communities | Networks |
| Enforcement | Usually relies on the state as an enforcer<br><br>Resembles enforcement mechanism of cartels | Might enhance opportunistic behavior<br><br>The ideal of internal markets might hurt incumbent workers | Needs control external to state bureaucracy (judges, parliament, market) to correct state abuses<br><br>Lobbies can capture public interest goals | Needs an internal enforcement authority<br><br>Facilitates collusion and imperfect competition | Needs trust and loyalty, often coming from outside (family, religion, ethnicity)<br><br>Compatible with various types of competition | Need an external enforcement authority<br><br>May facilitate cartelization and monopoly |
| Public good and externality | Useful for establishing standards and quality, for setting rules of competition in the industry<br><br>Useful for providing many goods collectively that individuals members cannot provide for themselves | Governance costs might exceed the benefits of internal division of labor<br><br>Slow to react to changes in the environment | Can provide public goods but has difficulties in providing them in precise amounts<br><br>Might fail in inducing technical change | Cannot provide collective goods or deal with externalities<br><br>Inadequate monitoring of technical change and innovation | Can internalize some collective goods (quality, training) but not others (welfare, general public goods)<br><br>Members tightly integrated into community, have limited capacity for innovations | Useful for enhancing quality and training but not very good in providing for societal general welfare<br><br>Weak in the provision of collective goals |

| | | | | | | |
|---|---|---|---|---|---|---|
| Efficiency | Facilitates cooperation and X-efficiency but not allocative efficiency[i] | Deficient in cooperation and X-efficiency | Can be highly bureaucratic and cannot easily deliver goods at low cost | Some basic social relations cannot be provided by pure market mechanisms | Some goods cannot be delivered at sufficiently low costs | Slow to enhance efficiency and speed of adaptiveness, except in industries where technology is complex and rapidly changing |
| Equity | Narrow encompassing associational structures lead to income equality | Excessive multiplication of controllers (frustration and inequality) | Might enhance inequality (power and privilege) | Facilitates inequality in income and wealth | Might lead to retarded development | When widely developed into industrial districts, networks may facilitate greater equality and income distribution. When weakly developed, networks tend to increase social inequality. |

1. For allocative efficiency and X-efficiency, see Leibenstein, 1966, 1976.

**Table 3**

**Rules, norms, habits and values associated with specific configurations of coordinating mechanisms, social systems of production, and national styles of innovation**

| | **U.S.A.** | **Germany** |
|---|---|---|
| | **Norms, Rules, Values Which Provide Incentives for Short Term Horizons** | **Norms, Rules, Values Which Provide Incentives for Long Term Horizons** |
| **Configurative Forms of Coordinating Mechanisms (listed in order of importance in the particular social system)** | Markets, Corporate Hierarchies, Regulatory State | Associations (business associations, labor unions), corporatist type networks, markets, corporatist type state |
| **Social System of Production** | | |
| ***Business system*** | | |
| Firm Structures | Conglomerates, but with movement toward elimination of production in some sectors. Emphasis on short term strategies. High differentiation between divisions of firms. | Firm more congruent with particular products. Emphasis on long term strategies. Firms are well integrated. |
| Firms Mobilized in and Integrated into Business Associations | Low | high |
| Industrial Relations System | Low degree of job security. Rigid internal labor market. Flexible external labor markets. | High degree of job security. Flexible internal labor market. Rigid external labor market. |
| Patterns of Ownership | Dispersed ownership, frequent turnover. | More stable ownership patterns. |

| | | |
|---|---|---|
| ***Training for labor and Management*** | High degree of voluntary decision making by individuals as to how much time and energy to invest in education. Heavy emphasis on business schools: training in marketing and sales, accounting. | Collective and more compulsory decisions about how much education is needed. Heavy emphasis on technical training (e.g., engineering). |
| Financial Markets | Equity and venture capital markets highly developed. Financing from central government to private firms for development of new technologies related to national security. | Equity and venture capital markets weakly developed. Heavy emphasis on corporate loans. |
| University Research System | High individual autonomy, high potential for individual creativity, university professors highly entrepreneurial. | Low individual autonomy until almost 40 years of age. Potential for individual creativity highly constrained. University professors not so entrepreneurial. |
| **Innovative Styles** | Highly successful in major breakthroughs in basic and applied science. Good in developing totally new lines of products and technologies. High degree of entrepreneurship among researchers. | High performance in process and incremental innovations in existing products, not so successful in major breakthroughs in basic science or in developing totally new lines of products of technologies. Low degree of entrepreneurship among researchers. |
| **Products in Which Society Excels** | Products with short lives, products in which technology is both highly complex and changes rapidly: entertainment industry, pharmaceuticals, biotechnology, software, aerospace. | Older products with long history: machinery, paper, printing, textiles, motor vehicles, machine tools. |