

## **SOCIAL NETWORKS, INNOVATIONS AND NATIONS**

**Sadettin Keskin**

Dokuz Eylul University

DEU IMYO C-Blok, Buca Egitim Fakultesi Kampusu, Buca-Izmir, TURKEY

E-mail: sadettin.keskin@deu.edu.tr

### **--Abstract--**

The conception of innovation has evolved quite drastically over the last 60 years. This evolution has generated two results: first, innovation is no longer considered as a discrete occurrence only engaging the development of technical solutions, but as a process also engaging interactions between all parts of society; second, in the social network theories, innovation results from the combinations of tangible forms of capital in conjunction with intangible forms of capital described by disorderly and sustained interactions occurring between economic actors.

This study introduces selected concepts from the analysis of social networks and integrates them into National Innovation System (NIS) conceptual framework. The application of social networks into NIS provides a deeper understanding of mechanisms driving industrial development.

**Key Words:** Social Networks, National Innovation System, Industrial Development

**JEL Classification:** 030

### **1. INTRODUCTION**

Within the NIS conceptual framework, all the economic actors have equal opportunities and function according to the same institutional rules. Regional and sectoral variants of innovation system approach narrow the analysis at geographical or economic scale but preserve an undifferentiated view of interaction within the system. This representation does not explain the existence of intra-national disparities: if the institutional environment affects the functioning of all the actors of the system in the same undifferentiated way, it is not clear why some regions, industries and firms perform differently within the same institutional setup. The individual capabilities of the actors and disparities in resource endowment offer a part of explanation. However, a growing number of

studies brings into light the importance of the structural role of social networks for the organization and outcome of technological and economic activities (Saxenian, 1994).

The main argument of this study is that the representation of interactive processes within the NIS is incomplete without taking into social structures that actively participate in technological, economic and institutional change. Thus, our purpose is to integrate social context of technological change into NIS conceptual framework.

## **2. NATIONAL INNOVATION SYSTEM**

By combining evolutionary approach to the firm and technological change with elements of institutional analysis (North, 1990), the NIS approach stresses that flows of technology and information among people, enterprises and institutions are key to the innovative process. The recognition of co-evolution and mutual inter-dependency of physical and social technologies as a driving force behind economic growth constitutes the core of NIS school.

The models of innovation systems are based on a traditional view of systems as interaction networks (Freeman, 1995). An innovative firm is seen as functioning within a complex network of cooperating and competing firms and other institutions, whose activities and interactions initiate, import, modify and diffuse new technologies (Freeman, 1995). The NIS approach offers a promising ground for complex innovative interaction analysis. However, there are certain gaps in NIS analysis about the kind of logic that leads inter-firms cooperative arrangements and how they co-evolve with their environments (their surrounding context).

In this respect, we argue that the explanatory power of social networks fills the gaps: in contrast to purely economic analysis it offers room for human agency and allows to take overall cultural and institutional environment and firm's innovative activities into account. Additionally, it underlines the impact of social relations on innovation and technological development which are not locked into a single institutional pattern.

### 3. SOCIAL NETWORKS IN NIS DYNAMICS

A social network can be defined as an arrangement of the differentiated elements linked to each other by multitude of ties. The emergence and development of social networks -the process of embeddedness- together with the network's fragmentation – the process of decoupling- ensure the dynamic of social arrangements and interactions.

The notion of embeddedness defines the contingent nature of economic action with respect to cognition, culture, social structure and political institutions, indicating the immersion or partial dissolving of one interactive network into another (Zukin and DiMaggio, 1990). While the process of embeddedness is mostly about the creation and development of social networks, the process of decoupling<sup>1</sup> is defined by opposition and signifies the loosening of the strings of network ties and the consecutive network's fragmentation into a 'social gel'<sup>2</sup>.

According to the type of relations prevailing in the network, there are two kinds of embedding process: structural and relational embeddedness. Although structural and relational embeddedness are critical to the understanding of social arrangements, the embeddedness argument is distant from the broader historical and social context.

---

<sup>1</sup> Decoupling process is not a destruction of networks, but a mechanism that ensures flexibility and dynamics of social structures. Decoupling means that the interactions between the actors do not involve a social interdependence anymore – they are ensured by the arm's-length ties (market relations). The arm's-length transactions are possible only if there is an adequate set of arrangements that substitute to the social relations: public information, judiciary system, conventions, legal rules, etc. that guarantees the equity of exchange. In other words, decoupling process is only possible in a context of institutional development that provides a relatively autonomous exchange system that enables an independent economic action.

<sup>2</sup> The notion of 'social gel' is a more complete way of representing social structures that goes beyond the idea of a network (White, 2001). While network analysis has made strides in the empirical study of social interactions, it only reflects a static part of the reality. The network metaphor reflects a snapshot of a structured set of actors related by certain ties. Social networks are about embeddedness – over both micro and macro scales – that brings social content and stability to the economic transactions. The metaphor of social gel shows how sociality escapes and exceeds specific networks through the process of decoupling, when the actors voluntarily or involuntarily disengage from their social context. The social gel is inhomogeneous and full of contingencies– possibilities for embedding and decoupling processes to emerge and vanish (White, 2001).

Therefore, while institutional and cultural embeddedness is analyzed within NIS framework with neo-institutional tools of analysis, the social networks offer a middle ground for studying relation ties among actors that are primary responsible for their choices. This implies that studying technological change from social networks perspective focuses on relations rather than attributes or characteristics of autonomous individual units, which, within the NIS framework, is examined with evolutionary tools of analysis.

The impact of embedded ties can be threefold:

- First, embedded relations are at least as important from sociological point of view as institutions for promoting trust in the society;
- Second, the over-embeddedness can also stifle effective economic action, leading to the structural inertia, if the social aspects of exchange supersede the economic imperatives. For example, feelings of obligation and friendship may be so great between trans-actors that a firm becomes a “relief organization” for the other firms in its network. The stronger firms in the network may dedicate resources to weaker members at a rate that outpaces their capacity to rejuvenate their own resources (Uzzi, 1997);
- Third, the social networks could increase the opportunity of malfeasance. First, because the relations of trust make the network’s actors more vulnerable. Therefore, the use of collective sanctions is an important feature of structural embeddedness. Network parties must know about malfeasance in order to act jointly to condemn or ostracize perpetrators. Second, because force and fraud are most efficiently pursued by teams (Granovetter, 1985).

Thus, social networks could have both the most beneficial effects on the society, generating trust and encouraging cooperation, and cause enormous damage by locking the society into rigid networks of connivance. As a result, embedded ties are responsible for development of various kinds of networks that exercise different impact on innovative activities.

#### **4. TYPOLOGY OF SOCIAL NETWORKS IN NIS**

A systemic approach to technological change requires an effort of classification of social networks according to their modes of influence on innovative activities.

Taking up the classification criteria suggested by Powell and Smith-Doerr (1994) for productive networks typology, the following typology of social networks in NIS can be proposed: traditional networks, business groups, regional networks and research and development (R&D) networks.

The impact of these networks on innovative activities varies significantly due to the particular composition of the network. They are not isolated from each other and interact in several ways. The extent and the nature of overlap between different networks are especially important for the innovation process, bearing heavily on the extent to which cooperation can be produced over large sectors of economy, without the intervention of the government. For example, regional networks and business groups usually have more distinct boundaries-geographically or organizationally- than traditional or R&D networks that integrate a broader set of actors. Social networks that involve a bigger number of actors and have relatively few barriers at the entrance are generally much more dynamic. When different types of networks are interconnected, sharing the same resources and participants, the heterogeneity of internal structures creates additional source of dynamics, preventing the networks lock-in.

#### **4.1. Business Groups**

Business groups are a widespread phenomenon in modern capitalism and are found in many countries under various names, such as the *keiretsu* in Japan, the *chaebol* in Korea, the *konzerne* in Germany and the family holdings in Turkey.

The explanation of the emergence of business groups is generally related to three factors: cultural heritage, political economy and market imperfections. The distinctive feature of business groups is the existence of social solidarity and social structure among component firms. In a purely functional sense, the axis or principle of solidarity for a business group is irrelevant, as long as it enables mutual trust to proceed and the group to continue in existence. However, in order to analyze the patterns of development for particular business groups and especially its implication for the technological development, one must understand the internal logic of groups' dynamics.

Furthermore, the role of the State for business groups is important in shaping ownership, authority structure, and relations of groups to financial institutions. When States and business groups taken together provide a degree of coordination

that balances private, sectoral and national interests, aggregate economic performance could be achieved.

#### **4.2. Regional Social Networks**

Social networking is the most efficient way of providing the possibility to respond by gathering and disseminating information and reallocating different types of resources in a fast and cheap manner. That is why regional network-based industrial systems like that of Silicon Valley are well suited to conditions of technical and market uncertainty. Producers in these systems deepen their capabilities by specializing while engaging in close, but not exclusive, relations with other specialists. Network relations promote a process of reciprocal innovation that reduces the distinctions between large and small firms and between industries and sectors (DeBresson & Walker, 1991).

Further evidence from the industrial districts of Europe suggests that the localization of know-how and information encourages the pursuit of diverse technical and market opportunities through spontaneous regroupings of skill, technology, and capital. The region, if not all the firms in the region, is organized to innovate continuously (Sabel, 1988).

As a result, spatial proximity is seen as necessary but not sufficient condition for the emergence of regional networks of innovation, that mostly rely on the way that skills and technologies are organized within the complex network of social relationships.

#### **4.3. R&D Networks**

Cooperation within R&D networks is both an entry ticket to an information network and a vehicle for the rapid communication about new opportunities and obstacles. However, innovative activities cannot be reduced to a simple process of information acquisition. They emerge from informal R&D collaboration, which usually takes on a more formal and contractual character once such projects lead to feasible products.

These innovative collaborations are often initiated by personal relationships promoted by geographical proximity. However, as innovative process goes along, decoupling mechanisms allow the firms to free themselves from purely geographical context, so that further collaborations could be only distantly linked

to the initial social network. Thus, innovative networks dynamics are quite important for national context, since they promote cross-industry and cross regional interactions essential for efficient functioning of innovation system.

Generally speaking, involvement in cooperative R&D projects widens the horizon of a firm's personnel and makes it sensitive to new developments and projects, which are external to the firm and its immediate environment or could be initiated by the firm.

Technological breakthroughs tend to level the playing field for involved firms. As mentioned earlier, these firms also generate profits by exploiting new opportunities, which are created in this whole process. Within R&D networks, mutual need develops rather than the goal to defeat the opponent. Here, the structural position of the firm within the network is decisive. The abundance of ties that link the firm to different networks of relations encourage R&D collaborations, controlling for prior collaborative R&D activity.

#### **4.4. Traditional Networks as a foundation of Social Capital**

After the collapse of the post-war 'fordist' model of capitalism, the search for greater flexibility and higher quality has become crucial for firms producing in industrialised countries with high labour costs. These changes have tended to give social capital a growing role. Large networked firms, networked of firms/innovators, and, more generally, industrial districts are dependent on the willingness and capability of employees and firms to cooperate effectively. High potential transaction costs can be counteracted by social capital (Ruigrok and Tulder, 1995). Accordingly, the value of social capital has increased in product processes and innovation. Of course, high social capital is not enough to take advantage of the new opportunities of the last decades (Rooks et al., 2009). Technical knowledge, i.e. human capital, as well as investment in physical capital is also important in addition to financial capital. However, it seems that social capital has become increasingly important in the sense that, by means of more effective cooperation between individuals and firms, it can affect of appropriate human capital and the efficient allocation of both physical and financial capital (Rooks et al., 2009).

The search for flexibility and quality is closely tied to new forms of cooperation based on the sharing of a language. Social capital facilitates the development of tacit knowledge as a competitive resource because it fosters the circulation of information and trusting relations between subjects within the firm and between

the firms (Rooks et al., 2009). This is not only related to inter- and intra-firm relations. It also relates to networks of relations between interest organisations as well as between interest organisations and public institutions. Such networks are crucial means to induce improvement of infrastructural facilities and efficient provision of economic and social services, as well as influx of capital and investment. Policies tend to be more effective if they are implemented through close cooperative relations between public and private actors enabling circulation of information and trust and limitation of opportunistic behaviour. This is reflected in the development of public-private partnerships and the sustained importance of negotiated forms of coordination, or more generally, the increased importance of policy networks and the emergence of various forms of governance as substitutes for government (Jessop, 1998).

Most of the mentioned networks are tied to localities or nations, contrary to the cross-border virtual networks associated with the development of IT (Lawrence et al., 2005). Some scholars argue that the globalisation process tends to reduce the advantages of social networks. Certainly, the process of globalisation involves a tendency towards de-territorialisation of production processes due to the transformation of factors of production into ubiquities, the homogenisation of consumption patterns and the removal of barriers to optimisation strategies at a global level (Ohmae, 1990). However, this is counteracted by other factors. Maskell (2000) summarises three ways in which the economic role of social capital increases as globalisation proceeds: social capital enhances the division of labour by reducing costs of coordination; it enables inter-firm innovation when market fails; and social capital remains a source of valuable heterogeneity between communities when former localised inputs are converted into ubiquities as borders become porous. The empirical evidence suggests that the result is rather increased competition between regions and a persistent pattern of specialisation in which the resource of social capital is crucial (Storper, 1997).

## **5. CONCLUSION**

Studies of social networks are essential not only for explaining the logic of interactions between individual actors, but also for understanding broader patterns of institutional learning, evolution of economic structures and the creation of new technological knowledge. Bringing social network analysis into NIS framework is key to a deeper understanding of mechanisms driving industrial development.

The presented typology above is the result of an effort to systematize the possible ways of dynamic connections between firms, industries and institutions, based on socially shaped relationships between actors.

Various kinds of networks exercise different impact on innovative activities: while business groups and traditional networks represent more rigid and organized forms of innovative interactions; regional and R&D networks, are much more open, flexible and dynamic. Nevertheless, all of these forms may be present and interconnected within the same NIS. The responsiveness and innovative efficiency of the system rely on the way in which different networks are cooperating. The social construction of innovative activities gives a key insight into the underlying logic of the process of technological change.

Furthermore, the over-embeddedness of the economy in the rigid type of networks (for example, business groups) may be damaging for innovative activities, whereas the development of regional and R&D networks across NIS produces innovative spin-offs and foster technological change. The significance of the institutional structures and government policies in dealing with the networks should not be overlooked, as they help to discourage malfeasance and connivance within the networks, thus promoting competitive and innovative arrangements.

## **BIBLIOGRAPHY**

Dandi, R. and Sammarra, A., (2009), *Social Network Analysis: A New Perspective for the Post-Fordist Organization*, ASNA 2009, University of Zurich/ETH Zurich

DeBresson, C. and Walker, R. eds., (1991), Special issue on networks of innovators, *Research Policy*. 20 (5).

Freeman, C. (1995) "The 'National System of Innovation' in Historical Perspective", *Cambridge Journal of Economics*, 19, pp. 5-24.

Granovetter, M., (1985), "Economic Action and Social Structure: The Problem of Embeddedness.", *American Journal of Sociology*, 91(November): 481-510.

Jessop, B., (1998), "The rise of governance and the risks of failure: the case of economic development", *International Social Science Journal*, 155, pp.29-46

Lawrence et al., (2005), "Managing Your Portfolio of Connections", *MIT Sloan management Review*, Winter, pp.59-65

Maskell, P., (2000), "Social capital , innovation and competitiveness", in Baron, S. et al. (Eds), *Social Capital. Critical Perspectives*, Oxford, pp.111-123

North, D.C., (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge :Cambridge University Press.

Ohmae, K., (1990), *The Borderless World*, New York:Oxford University Press

Powell, W.W. and Smith-Doerr L., (1994), "Networks and Economic Life" , in Neil J. Smesler and Richard Swedberg (eds) *The Handbook of Economic Sociology*, pp. 368-402. Princeton, NJ: Princeton University Press.

Rooks, G. et al., (2009), *Social capital and Innovative Performance in Developing Countries: the Case of Ugandan Entrepreneurs*, 7th GLOBELICS Conference, Dakar

Ruigrok,W. And Tulder van R., (1995), *The Logic of international Restructuring*, London:Routledge

Sabel, C., (1988), "Flexible specialization and the reemergence of regional economies", in Hirst, P. and Zeitlin, J., eds. *Reversing industrial decline?: Industrial structure and policy in Britain and her competitors.*, Oxford  
Storper,M., (1997), *The Regional World. Territorial Development in a Global Economy*, New York

Storper,M., (1997), *The Regional World. Territorial Development in a Global Economy*, New York

Uzzi, B., (1997), " Social Structure and Competition in Interfirm Networks : the Paradox of Embeddedness", *Administrative Science Quarterly*, 42(1), pp.35-67.

White, H., (2001), *Market from Networks*, Princeton University Press.

Zukin, S. and DiMaggio, P., (1990), *Structures of Capital: The Social Organization of the Economy*, Cambridge University Press.