ECONOMIC AND SOCIAL NETWORKS:  
A CONCEPTUAL ANALYSIS

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Abstract: Economics of networks is a relatively new field of research. While the neo-classical economics treated increases in output as a function of technical relationships between inputs and outputs, the network based approaches treat increases in output not only as a functional relationship between inputs and outputs, but also as a function of economic and social networks forged between firms, individuals and institutions. Theoretical and empirical studies under different approaches show that firm formation, growth and output expansion are positively related to the economic and social networks formed by the different actors.

Key words: collective efficiency, game theory, global commodity chains, industrial districts, Input output analysis, networks, social capital, transaction cost)

INTRODUCTION

Considerable literature has accumulated over the last three decades on economic growth and industrial and business linkages. The classical and neo-classical tradition did not pay much attention to the role of networks in propelling economic growth and consequently neglected the role of costs of a commodity other than production costs. For the neo-classical economists, firms are mere production functions operating under conditions of certainty. The only exception perhaps was Marshall (1920) who did talk about externalities and inter-firm relations. In recent times, there has been a significant shift of focus towards treating firms as governance structures that enjoy significant network effects (Christensen, et. al, 1990; McGuiness, 1991; and Lundvall, 1993).

Modern economic analysis lays a great deal of emphasis on the role of networking in the growth trajectory of firms. Network analysis is essentially a multidisciplinary theme that cuts across economics, sociology, geography, political science and mathematics. But we confine our analysis in this paper only to the economic dimensions of the problem and touch upon other dimensions only in so far as they are absolutely necessary for a fuller understanding of their economic implications. The primary objective of this paper is to discuss the various approaches that deal with networking as an important parameter of growth and also to trace the common thread that runs through those approaches.

Network analysis was basically initiated by sociologists, but soon was taken up by game theorists as well (Jackson, 2007). The sociologists’ analysis centred on personal
and social networks such as kinship, marriage relations, friendship, caste, trust, community etc. Economic and business networks comprised mainly of contractual relations, business associations, financial institutions, technological relations etc. A number of studies have been undertaken in the realm of both the strands of literature. Studies by Aldrich (1989), Cromie and Birley (1992), Donckels and Lambrecht (1995), Reese and Aldrich (1995) and De Clercq and Voronov (2009), Watson (2007) among many s argue that social capital emanating from social and personal networks generally positively impact rates of business formation, survival and growth. While discussing network formations, Jackson (2007) distinguishes between two sources of networks: random graph literature and economic literature. In random graph literature, it is primarily through a purely stochastic process or through algorithms for building links that networks are formed. In economic approach, links are forged through the actions of self-interested agents who are instrumental in forming equilibrium networks.

Development economics has witnessed in recent times the emergence of a number of network based paradigms some of which draw heavily upon development sociology and economic geography. All these paradigms are essentially built on the network blocks. Among them the following deserve special mention.

1. Traditional Linkage analysis;
2. Game Theoretical approach;
3. Transaction Cost approach;
4. Industrial Districts and Clustering;
5. Social Capital approach; and

TRADITIONAL LINKAGE ANALYSIS
Among the modern economists, it was Hirschman (1958) who first spoke about the role of forward and backward linkages in economic development. The relative strength and weaknesses of these linkages determine the growth trajectory. Hirschman’s analysis unleashed a good deal of subsequent debate on growth linkages. Agglomeration economies became a dominant paradigm in economic discourse in the wake of Hirschman’s contribution. Input output analysis (IOA) provided important analytical frameworks for the understanding of inter-sectoral linkages in an economy. The Leontief inverse began to be used as a powerful tool of linkage analysis. Input Output analysis enables the creation of tables that show the quantity of output of one sector that goes as inputs into another sector. From these tables the proportions of flows are worked out. These proportions or coefficients form the technological coefficient matrix. While inversing this matrix one obtains the Leontief inverse which can be used to predict the outputs of various sectors while there is a change in the output of one particular sector in the economy. Here the nature of linkages between various sectors in the economy determines the quantum of growth in the output of different sectors. This technique is also used to understand structural change in the industrial sector as well. The linkages between the different sectors have some similarity with the networks
ECONOMIC AND SOCIAL NETWORKS: A CONCEPTUAL ANALYSIS

that exist between different firms in an industry. These are networks as that are technologically and not socially or personally determined.

In the early 1960s input output analysis was extended by Pyatt (Stone and Brown, 1962) to develop social Accounting Matrices (SAMs). While IOA shows the inter-sectoral flows of goods and services in an economy, SAM is used to demonstrate flows among the different classes in the socio-economic system. Later in the 1980s using the SAM based methodology, the Computable General Equilibrium (CGE) model and its different variants were developed. These models help us to evaluate how an economy might react to changes in policy, technology and external shocks. Estimates made on the basis of CGE models are highly useful in quantitative policy analysis.

GAME THEORETIC APPROACH

Industrial Organisation as a separate branch of economics acquired respectability in the main stream economic discourse, only when game theory developed as a powerful analytical tool. Before the emergence of game theory, the inter-industry relations were explains using the Structure-Conduct-performance (SCP) paradigm. As the SCP tool is more descriptive than analytical, main stream analysts were reluctant to use it in their studies of industrial organisation. As game theory is technically more sophisticated, it began to be increasingly used in understanding the evolution of industries. Game theory basically deals with the consequences of cooperation and non-cooperation in the strategic decision making of oligopolistic firms. In the famous Prisoner’s dilemma game, if both players defect they do worse than had they cooperated (Axelrod, 1984). In the more sophisticated versions of games, cooperation is rewarded and defection is punished. Nash Equilibrium which is based on cooperation remains stable in most types of games. As Myerson (1999) argues, “Nash carried social sciences to a new world where a unified analytical structure can be found for studying all situations of conflict and cooperation.” Linkages based on trust are at the core of game theory. All commercial transactions have within themselves an element of trust (Arrow, 1974). In the context of imperfect or asymmetric information, bounded rationality and risk and uncertainty, trust plays a key role in fostering cooperation through networking between firms (Sako, 1992). It is these networks that are forged in the process enable firms to perform better in both good and bad situations. Even the classical mathematical oligopoly models of Cournot and Bertrand acquired greater relevance in modern industry analysis, when the application of game theory made it more rigorous in their ability to predict.

TRANSACTION COST APPROACH

According to the transaction cost approach firms emerge and exist due to transaction costs involved in entering the market such as negotiating for goods and services and enforcing contracts (Coase, 1937). Unlike the belief of neoclassicals markets do not necessarily minimise costs. The essence of Coase’s argument is that if the cost of carrying out a transaction in the market is higher than the cost of carrying out the same transaction within the firm, firms will internalise the transaction in order to lower the costs. Transaction costs comprise of search and information costs, bargaining and decision costs and policing and enforcements costs. These costs are sometimes enormous
and hence firms find it difficult to cope with while dealing with the markets in buying and selling.

The critical dimensions of transactions are uncertainty, frequency and degree of durability (Williamson, 1981). Hence firms often confront the question: to make or buy. Markets are often asymmetric where the information is incomplete. Market failure occurs more often than not. In such markets transaction costs are very high. Then firms are left with little option but to internalise the transaction costs. But these days, firms are increasingly opting for vertical integration.

A vertically integrated firm avoids the costs of using the market. This means that such a firm absorbs the alternative costs of administering vertical flows of products and organising factors of production (Hobbs, 1996). In such situations, firms enter into contract with suppliers for parts or components. These contractual relations can be either “exit” type or “voice” type or “arm’s length” or “distant” type. In voice or arm’s length type, firms negotiate and renegotiate the terms of contract so that smooth function through long lasting relationship is possible. Such relationships take care of the interests of both the suppliers and customers through constant interactions and give and take. This renders the relationship stable in good times as well as bad times. In exit or distant type, the relationships are mere contractual and no give and take is involved. If any party violates the terms of the contract, the relationship comes to a grinding halt. In all these types, networking plays a key role in governance and coordination.

According to Coase (1937), market prices govern the relationships between firms. But within firms, the decisions are made not on the basis of profit maximisation, but through entrepreneurial coordination. A major source of transaction costs is the opportunistic behaviour of agents. Hence trust becomes an important element in transaction cost approach. Trust is built through the network of agents (Foss and Koch, 1996).

INDUSTRIAL DISTRICTS

Though first discussed by Marshall in the 19th Century, studies on industrial districts became popular only recently. The whole debate started with Piore and Sabel (1984) who brought to the notice of the English speaking world the successful functioning of industrial districts in the ‘The Third’ Italy. Later such successful districts were located in other parts of Western Europe (Humphrey, 1995). In developing countries also some variants of industrial districts exist and they are popularly known as clusters (Rabello,f, 1997; Nadvi and Schmitz, 1994). The districts or clusters are mainly a collection of small and medium type spatially concentrated and sectorally specialised enterprises. They exist in a relatively homogeneous and cultural and social background. These enterprises are linked through an intense set of backward, forward and horizontal networks. Such linkages are based on both market and non-market exchange of goods, services, information and people.

There are four key factors that define the success of industrial clusters in developing countries: cooperation among large and small enterprises; collective responsibility of local associations; cooperative relationships between the different actors in the value
chain; and financial support system existing among the participating agents (Fischer and Reuber, 2003). Unlike game theory which deals with either cooperation or non-cooperation, cluster analysis entails the coexistence of competition and cooperation (Rabellotti, 1997). In the enterprise clusters there exists a network of public and private local institutions supporting the economic agents and actors in procuring finance, labour, raw materials and specialised services. The key success factor in the clusters is innovation which is the outcome of strong inter-frim collaboration in production and marketing. Such collaboration leads to collective efficiency (Schmitz, 1995) which is very different from economies of scale, but pretty close to economies of scope and experience.

An individual enterprise in isolation cannot enjoy collective efficiency which is the collective effects of static and dynamic external economies and cooperative effects (Rabellotti, 1997). According to Schmitz (1977), “Collective efficiency is the competitive advantage derived from local economies and joint action”. Joint action can be both horizontal and vertical. Each one of them can be either bilateral or multilateral. Collective efficiency is defined by Schmitz (1995) as follows: “division of labour and specialisation amongst the small producers; the provision of their specialised products at short notice and at great speed; the emergence of suppliers who provide raw materials or components, new and second-hand machinery, and spare parts; the emergence of agents who sell to distant national and international markets; the emergence of specialised producer services in technical, financial, and accounting matters; the emergence of a pool of wage workers with sector specific skills; the formation of consortia for specific tasks and of associations providing services and lobbying for its members. The more of these elements that are present, the more real the notion of collective efficiency becomes”.

SOCIAL CAPITAL APPROACH
Social capital may be defined as the resources mostly intangible that is available through a set of social relationships and that facilitates the attainment of goals (Bordieu and Wacquant, 1992). In other words, they are intangible resources that accrue to individuals or groups through their network of social ties. They arise from trust, reciprocity, mutual support etc. Apart from these traditional ties, social capital also is created through modern networks such as face book, email etc. The ties that underlie social capital can be strong, weak or in between. All of them add to the creation and maintenance of social capital in different measures. It is different from physical capital.

Social capital unlike physical capital is tangible and not easily transferred. It enhances the productivity of physical capital through its network of social relationships and “the assets embedded in and available through the network” (Leenders, 1999). Investment in social capital is a complement to that in physical capital, human or technological capital (Mcnaughton, 2000). Social capital is created through the formation of relationships. The quantum of social capital appreciates through use in repeated action. The chief underlying force behind social capital is trust (Putnam, 1993). The supply of trust increases as the stock of social capital appreciates. It is seen as equivalent to a productive asset. This, therefore enhances society’s economic efficiency and welfare as well. Social capital influences the success of enterprises through networking (Shao and Aram, 1995).
However, a problem with social capital is that it can sometimes become “perverse” in the sense that it retards development by effecting alterations in the traditional relationships (Rubio, 1997). Criminality, drug abuse, rent seeking etc. impact economy and society in the reverse direction. Similarly, when social capital is indiscriminately used for selfish motives, the community around will notice the misuse. This might result in the depletion of the social capital stock and its effectiveness in wealth creation. Further, social capital as a concept lacks consensus on its definition and hence suffers from inherent weaknesses (Molineux, 2002). Further research is required to fully establish its role in boosting productivity and economic efficiency.

GLOBAL COMMODITY CHAIN ANALYSIS

The Global Commodity Chain (GCC) perspective is concerned with the power relationship in production and consumption activities between advanced and developing countries and the prospects of the latter in joining the former as core nations. GCC approach, in other words, focuses on analysing economic and social organisations tying nations together. It is a network centred and historical approach (Gereffi, 1994). A significant variant of GCC analysis is the Value Chain approach. While the nomenclature GCC has a political economy connotation, the latter is more value free and more frequently used in literature.

A significant variant of GCC analysis is the Value Chain approach. While the nomenclature GCC has a political economy connotation, the latter is more value free and more frequently used in literature. As modern manufacturing is geographically spread across nations, processes like raw-material supply, production, marketing and sales are scattered in different countries and carried out by networks of firms linked organisationally with each other. The linking of economic activities encompassing production and consumption is captured by commodity chain analysis. A commodity chain is defined as a “network of labour and production processes whose end result is a finished commodity” (Hopkins and Wallerstein, 1986). Gareffi and Korzeniewicz (1990) expanded the concept to include both forward and backward linkages from the very stage of production to ultimate consumption. The structure of GCC results from a particular way of organising value adding economic activities to produce and distribute a commodity (Theresa Shuk-Ching, 2002). These activities are carried out through sets of inter organisational network linking households, firms and states to one another within the world economy (Gereffi et al., 1994).

The nature of the agent that coordinates the chain directly influences the possibility of upgrading the relevant segments of the chain in less developed countries. Chain coordination can lead to increases in efficiency and cost reduction (Gibbon, 2001). With regard to internal governance structures, GCC analysis distinguishes between two basic types of chains: “producer driven” and “buyer-driven”. In buyer driven value chains, the critical governing role is played by retail buyers (located mostly in developed countries) whose core competence lies in design and marketing. In producer driven value chains key assemblers or producers commanding vital technologies, process production competencies, control R & D and coordinate the various links.

Authors like Kaplinsky (1998) prefer to use the term Global Value Chains (GVC) to GCC. To them GCCs “implicitly negate the idea of upgrading.” The GCC framework
also fails to capture the variety of network forms such as information and communication technologies that emerged after the 1990s. Hess (2008) moves one more step ahead and prefers the nomenclature Global Production Networks (GPNs) to GCCs or GVCs. He argues that GPN "opens up ways of thinking about embedding and dis-embedding processes in Global Value Chains and networks as a matter of (temporal) coalitions between actors, without neglecting the power asymmetries between the actors involved, whether they are firms, states or any other non-firm institutions". The GPN variant further suggests that workers (labour) – a key player till recently ignored by GCCs or GVCs – can have a significant impact on commodity chains (Rainnie, et. al, 2011). However, as the nomenclature GCC has a political economy connotation unlike GVC and GNP which are more value free, we prefer to use the former.

Thus in GCC analysis, networks among firms and different actors at different value adding nodes are important determining elements.

CONCLUSION

Industrial and business networks are an emerging area of study which has multidisciplinary dimensions in the true sense. In the traditional economic analysis, output is a technical function of inputs such as land, capital, labour and organisation. The level of technology decides the level of output, given inputs. Certain technological factors give rise to scale economies. But recent research shows that output can rise even above the threshold fixed by the input output relations. It is precisely this increase in output that is accounted for by economic, business and social networks. The different approaches described above deal with networking and its operating mechanisms. In the traditional linkages approach such as input output analysis, networking is treated in a technical sense and the increment to output is purely due to technological factors. This is very much within the framework of standard neo-classical economics.

In all other paradigms, except GCC analysis, the cementing force behind networking is trust. Trust builds relationships and they in turn lead to enhanced efficiency and social welfare. In GCC analysis, it is the power structure that determines the nature of networking. In other words, the governance structure determines the chain coordination and the consequent networking effect. In all the approaches, however, networking plays a vital role in value addition which has been overlooked by traditional economic analysis.

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