Networks

Todeva, Emanuela

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Emanuela Todeva, University of Surrey

Definition

Networks are *social structures of relationships* between interacting heterogeneous actors. They are structural or organisational formations that facilitate interactions between actors and exchanges of some kind. The patterns of relationships emerging as a result of the interactions and exchanges between human and institutional actors facilitate resource allocation within the social structure, and the concentration of power. The ties that are initiated between social actors evolve into complex frames of power and dependency relationships. Networks are configurations of present and absent ties between actors, affected by major events, or extremely desirable objects, by institutions, texts and other cultural artefacts.

Conceptual Overview

One of the early contributions from the sociological perspective has been the theorising by George Simmel who attempted to explain the emergence of the social phenomena as arising from exchanges, relations, and reciprocal action of human agents. He described the society as a *network of affiliations* and a complex *inter-subjective movements*, i.e. activities and intentional behaviour of conscious human actors. Social structures arise from relationships embedded in affiliations and inter-subjective movements, inter-subjective dynamics which bond people together.

The actors in a network are human, non-human, and social artefacts, or time-specific events and activities. While the network heterogeneity is evident for the earlier developments of social network analysis, with the formalisation of the research methodology the network concept is reduced to dyadic interpersonal relationships or community type collective referrals.

Present ties are the existing relationships and exchanges between members. The notion of absent ties in networks remains controversial, and could be interpreted in many different ways. Absent ties could be, for example, unsatisfied needs for resources and information, or potential relationships, i.e. new opportunities for

[1] In: International Encyclopedia of Organization Studies, 2007, Sage.

establishing ties with network members that have some resources at their disposal. In all cases, network membership based on existing ties is assumed.

The history of network analysis is traced back to the development of the sociometry and the graph theory. Subsequently the historians point to the developments within the American sociology in the 70s and 80s, and the development of the International Network for Social Network Analysis (INSNA). The critical assumptions that underpin these developments are the following:

- Actors' behaviour depend in large on how actors are linked to each other, and behaviour results from the structural constraints on activity such as the socialisation of norms;
- Norms emerge from locations of actors in structured systems of social relationships;
- The network topology represents the structural configuration of the network;
- The network flow, or the flow of information between actors, depends on the network topology and the time;
- Diffusion is affected both by direct and strong ties, and by weak ties that enhance access to information and opportunities;
- Modern socioeconomic systems are constructed as lengthy chains of indirect exchanges, where direct reciprocity is often impossible;
- Interconnected complex exchanges reinforce inequalities (imbalances) and change actor's dependence on others;
- Power and inequality in a dyadic relation arises from ego's control over some resource valued by alter;
- Special emphasis is put on the notion of structure as a network of networks, that may or may not be partitioned, and hence there are no clear guidance on what are the building blocks or the boundaries of a structure.

A fundamental explanatory framework for network behaviour is the structural theory of action. Action can be experiential, cognitive, normative, purposeful, spontaneous, a reaction, or interaction. In the context of this theory, relationships emerge from attempts to utilise resources in order to realise interests. Interests emerge from the already existing division of labour and distribution of roles (or *status/role-set*) that position each individual vis-a-vi the other members. The status/role set determines also the structural autonomy of the actors ignoring variation in individual

attributes of these actors. The social topology of a network, or the structure, is constituted by the status-role sets that emerge in the process of interaction.

Interaction emerges when two or more actors connect. Interaction in a dyadic or network relationship can not be easily broken dawn into individual actions. Interaction gives another dimension to the events that unfold between the interacting entities. Understanding the variations in actions and actor's behaviour is essential to understanding network processes.

Although structuralists acknowledge that structure emerges from relationships, empirical investigations assume the existence of these relations and do not study variations in relationships apart from the symmetry and the strength of ties. Both the individual attributes and the relational attributes are excluded, or reduced to a minimum in network analysis.

The method of social network analysis (SNA) has aimed to prove primarily to sociologists and behavioural scientist that the structured social relationships are a more powerful explanatory tool then the personal attributes of system members. However, in its natural development SNA has neglected the fact that individual attributes of the actors matter as well. Actors' choices and decisions to interact are framed by multiple factors including the attributes of the initiator of the relationship, individual attributes of potential partners, and other properties of the relational set.

It is one of the paradoxes of SNA that the object of analysis – the relationships between nodes – is assumed in either/or categories as a bundle of actions and behaviour of the actors. The relationship is either present or absent, directed or symmetrical, strong or weak. Although it is clear that a relationship is in fact a process of interaction between actors or entities, this processes is disembodied from its dynamic component, and is reduced to a link.

Critical Commentary and Future Directions

Network theory has grown out of the advancements in SNA, the research on industrial markets and supply chain management, the developments in the field of knowledge and technology networks and actor-network theory. The earliest approach to network analysis is the structural or positional approach, based on the structural paradigm in SNA and the work by Knoke and Kuklinski, Burt, Wellman and Berkowitz, Nohria and Eccles, Krackhardt, Wasserman and Faust, and the wealth of methodological work by social network analysts. The emphasis in this work is put on

structure, form, and action within networks; on measurements and methodology for SNA; on structural holes in relational networks, the strength of weak ties, and the small-world networks.

The structural / positional approach supports research when the network boundaries are not known, but it requires knowledge of all relationships of an actor (or building Ego-networks for each actor) in order to determine their position in relation to all other members of the network.

Overall the structural/positional approach has not been able to address the complexity and dynamics of network processes that unfold as part of the interactions in networks. Structural analysis in principle does not take into account the heterogeneity of actors and the variation of network relationships. As such, structural analysis does not facilitate research of adaptations in complex systems. Among the alternative approaches to network analysis that have developed a conceptual apparatus to study the relational dynamics is the relational approach.

Under the relational approach it is acknowledged the existence of three overlapping network structures. These are: the network of actors, the network of resources exchanged by them, and the network of inter-linked activities ('A-R-A' model). The exchange relationships usually are conceptualised as taking part between firms as collective actors that are performing various activities and are employing heterogeneous resources. Connected relationships link actors that share common network perceptions, comply with a set of norms of business interactions, and participate in chains of activities. Connected relationships represent constellations of resources employed in value systems that support actors and activities.

In this framework, resource is defined as a possession or a capability of an actor, which obviously affects interactions, but is not the sole purpose of it. Resource flows occur when actors exchange information, products under their control, and services within their capabilities. Resource flows comprise of simultaneous and parrallel resource links and commitment links.

Activities in networks differ from individual behaviour of actors as they establish a framework that facilitates collective participation, and cumulative outcomes at dyadic and at global network level. Participation in activities means actors taking part in events and contributing to a scenario that involves other actors and multilateral distribution and utilisation of resources. Participation means also

information and knowledge exchanges that lead to emergence of communities of practice and knowledge structures.

The three overlapping networks generate power structure, knowledge structure, functional interdependence, and inter-temporal dependence, or the history, memories, knowledge, and routines of existing interactions.

The relational network model is voluntaristic, and not deterministic, and this makes it difficult to lay solid research foundations for empirical testing. However, its main advantage is that it reflects the reality of repetitive business transactions and long-term network relationships, and enriches our understanding of differentiated structural layers of interaction.

The cultural approach to network analysis has its roots in two main streams of thought – the actor-network theory with its emphasis on human-technology interaction and knowledge networks, and the critique of the relational approach with focus on the cultural aspects of network interactions.

The cultural aspects of networks are described as *ideas*, *meanings*, *logics*, *norms*, *theories*, *ideologies* and *rules* within knowledge systems, *reflection*, *subjective interpretation*, *imagination*, and *self-awareness* of network actors. All these cultural aspects are treated as real artefacts, rather then as nominal general processes of human imagination. This is adopted from the actor-network theory where the actor world is represented as a network of entities such as *knowledge, technologies, technical artefacts,* other *human beings, skills, money, texts,* and other *objects* and *resources*. The actor-world is composed of all interconnected *elements / entities* and their *contexts* that they bring to the network. Network analysis from a cultural perspective focuses on the experience of network actors as cultural participants, i.e. acting, interpreting and imagining networks – through *language, symbols, myths, stories, rituals* and other processes of human action and imagination.

The cultural perspective acknowledges the existence of cultural artefacts, their direct impact on human interactions and relationships, and the spontaneous emergence of new structures and new forms of behaviour in open systems. Authors acknowledge the framing effect of cultural artefacts – perceived both as physical objects and as self-organised consciousness. The cultural perspective refers to networks as living systems that can invent themselves, that can modify their relationship structure and can manage their internal and external environment.

According to this methodological approach, cultural artefacts such as knowledge and technology can act and exercise power within networks, locking firms into a particular strategic choice and configuration. Both human and non-human actors have a dual existence in a network: they exist by themselves with their own properties, and they exist as enrolled, incorporated, mobilised, or absorbed by the network, with ascribed roles and functions. Important elements of the actor-network are also the *outcomes* from the activities of the enrolled actors, or the artefacts of their behaviour as network members.

The human actors, compared with the non-human ones act strategically and negotiate the frame for their interactions, i.e. the rules and the roles that each of them has to play. In this way the human actors drive the network processes.

In the list of actors are included texts, acting as pure intermediaries. Texts participate as intermediaries in the processes of *ascription* of roles*, translation* of meaning, information, rules and practices*,* and *enrolment* of other entities and contexts*.* Texts carry the message of the translator, the reader, and the audience simultaneously. Texts are treated as spokesmen or exhibiting actors' presence. The translator's capabilities of translation and enrolment are crucial as much as the reader's capabilities of decoding and deconstruction of the meaning of these texts. Texts, along with other network resources and artefacts, are also called 'media' because of their intermediation in the cultural process of communicating and acting.

Of primary interest to network analysis from the cultural perspective is to identify all key actors in a network (human and non-human), and to deconstruct their interests, their strategies and their power to influence network processes. Cultural network analysis aims to reveal those driving forces behind interactions that are encrypt in the actor's properties, in their institutional form, in their position in the network of interconnected elements and in the contracts that bond actors with each other.

By incorporating *human* and *non-human elements* along with *cultural and organisational artefacts* in the network, the cultural approach raises new fundamental research perspectives in network analysis. One of the main strengths of the cultural perspective is its focus on heterogeneity of actors and the processes that take place in a network.

One of the main criticisms of the actor-network theory is against the way it empowers the non-human actors ascribing to them organising capabilities in the form

of structuring and framing of the network. The power of non-human actors derives not from their will and choices, but from their attributes and from the network effect of their application by human actors. For example, technologies employed in a product and process development project effectively frame the choices of human actors, imposing standards and requiring resource commitments at certain level. The network roles of non-human actors represent a translation of their attributes and employment of their resources and intrinsic capabilities by human actors for a specific purpose. Non-human actors such as technologies, scientific, manufacturing and organisational artefacts can be incorporated in contracts, but are not recipients of contracts by themselves, and can not hold responsibilities in a contractual relationship. The participation of non-human actors or objects in a relationship is determined by the human choices made in association with these non-human entities or their attributes and capabilities. Once employed however, they can impose their attributes on human actors, making them dependent on the interactions with the non-human entities.

All three approaches – the structural/positional, the relational, and the cultural - have generated a rich pool of observations that extend the conceptual boundaries for understanding of actor behaviour in a relational and cultural context. All three approaches address the structural consequences of interactions between network actors. The structural/ positional approach explains conceptually relationships between autonomous actors, the role and position of individual partners. The relational approach examines interconnected relationships and resource dependencies between actors. The cultural approach explains the role of cultural proximity and attitudes, technologies, and other embedded socio-cultural artefacts on partnering agreements, on the process of partner/supplier selection and relationship management.

See also: business networks, social networks, agency, alliances, interaction analysis

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