

ORGANIZATIONAL PERFORMANCE AND SPATIAL PATTERNS

Development of two methods into a tool for understanding the interaction between individual networks and spatial structure

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Abstract

This paper investigates the analytical power of combining two existing methods from different disciplines. One being Social Network Analysis originating out of social sciences and the other Space Syntax Analysis developed for studies of built form. Social Network Analysis describes relations between people and their characteristics. Space Syntax Analysis is a method for description of spatial systems, thus making it possible to analyse these. The study presented has implications on both research and on managerial issues related to performance of organisations.

1. Introduction

A place of work, an office for example, consists of physical, spatial settings, like rooms, corridors and other spaces. It is also a place where people do their work, where they interact with each other, with customers and other actors. A place of work could be described in terms of both social and spatial factors. Today, we have at our disposal different models to study these dimensions. This article presents and discusses two of these models of analysis. Space Syntax Analysis (SSA) is a model that focuses on the physical, spatial dimension, while Social Network Analysis (SNA) focuses on the social dimension.

Our aim is to present SSA and SNA, discuss some aspects of homology of the models, give an empirical illustration of some results of SNA and SSA, and, finally, argue that further research efforts should be made to combine the two models in order to create a new model of analysis that, simultaneously considers aspects of social and spatial dimensions.

2. Aspects of homology of SNA and SSA

The two models have many basic traits, perspectives and methodological aspects in common. They make use of graph theory, and some of the concepts and terms are the same. However, the interpretation sometimes differ. Some terms relate to different concepts and sometimes the models use different terms to relate to the same concept. Concepts like “nodes“ and “lines“ are, however, used in both models, and play a similar and important role.

SNA focuses on the way actors in a social system relate to each other. The actors, people, or other subjects, and their relations are possible to describe with the help of graph theory (Allen, 1985; Krackhart & Hanson, 1993; Nohria & Eccles, 1992; Scott, 1991; Steward et al. 1993). The actors are represented as “nodes“ whereas “lines“ describe the relations between the nodes. It is possible to describe different types of relations. Some relations are symmetrical (“actors A and B work together as employees“), while other relations are asymmetrical (“actor C is the superior of actor D“). It is also possible to discern the value of a relation (“actor E likes F better than G“). SNA utilises different measures to describe aspects of the relationships between actors, of subgroups of actors and of the whole social system (social network). A “star“ is for example an actor that is related to many actors of the system. If many relations are concentrated to few actors, the network structure is described as “centralised“.

SSA study the way different spaces are related to each other. Utilising graph theory, the spaces are defined as “nodes“ and the relations between them are defined as “lines“. A room in an office-building could be described as a “space“, and the way you can move from it to other spaces (using the doors between the rooms and other spaces) is the way the spaces are related to each other. The spaces, and their relations, can be described from the point of view of a specific space, i.e. a node put on the “zero level“. The nodes, the lines between them, and the number of syntactic steps from the zero level, could then be defined. A “deep“ structure has many levels, while a “shallow“ structure has all the nodes close to the zero level. Different measures in SSA focus on the depth of the structure, from a specific node’s point of view, on the relationships between the nodes, both *local*, or on aspects of the total, *global*, system. (Hillier & Hanson, 1984; Peponis, 1990)

3. Background of the study

Modern organisations are no fixed structures and could better be described as an arena where people interact in different ways. Organisations live by their informal organisation, based on the day to day activities which include the daily work, problem solving, meetings etc. The way people interacts and what they communicate thus become of paramount interest.

Furthermore, spatial issues are seldom discussed when it comes to evaluating organisational performance. The building, or the premises, where the organisation perform it’s activities is often, from an organisational perspective, taken for granted. Usually the workspace is considered with construction economy and corporate style in mind rather than organisational performance. (Granath, Adler & Lindahl, 1995; Vischer, 1995)

There are no analytical methods that enable a simultaneous investigation of organisations in their spatial context and the quality and meaning of this interaction today. It seems, however, plausible that new questions could be raised, as well as new patterns of organisational activities would emerge, if the SSA and SNA methods are combined.

4. Study on the combination of SNA and SSA

The feasibility of combining the two methods was tested through a study of an electronic design department. Previous studies indicate that the possibilities to develop competence in an organisation and also the kind of knowledge and information obtained, is related to the spatial relations between individuals and groups. The layout also enabled the individuals to compensate for a deficient computerised knowledge base within the company through what we call “learning-by-walking-around” (Granath, Adler & Lindahl, 1995; Hörte, 1995).

The overall question was whether there were any relations between the physical location of individuals and their position in the social network structure. The characteristics and quality of that relation was equally important.

Another question is if SSA can be used to clarify the role of the spatial layout for performance of the organisation. Do individuals represented by central nodes have a greater interaction pattern, i.e. spanning greater distances in the syntactic map. What type of management behaviour could be observed, what type of social network and spatial position were related to this etc., were other questions.

4.1 SNA

One aim of the study was to analyse different aspects of the “informal organisation“ and relate these to aspects of the formal organisation. Information about daily routine work relationships, competence related communication, and relations based on trust were studied. A social network study of three relations between actors of a design department is presented in Hörte (1995). A SNA analysis based

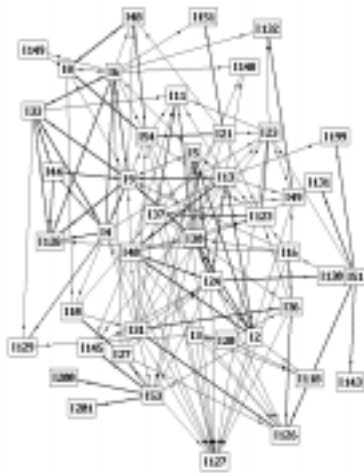


Figure 1. Work related network

on daily work related communication reveals that the formal position of an actor are important. The managers (actors I126, I127 in Figure 1) are central actors in the work based network, as are the technology experts. The managers and experts are also central actors in the competence related network. The managers keep their central role in the trust related network, but the technology experts are no different from other actors in the trust network.

There seems to be a difference between the spatial spread of the three networks. The spread of the work based network is much smaller than the competence related network. The formal position and role of an actor then explains some of the relationship patterns. Could SSA be of use to add explanatory power to SNA? SSA could, for example, provide measures of the spatial aspects of the spread of the networks.

4.2 SSA

An analysis of spaces in the actual building was made mapping all spaces into one system. This enabled analysis of the spatial structure. The graph in Figure 2 illustrates the spatial nodes related to I126. Figure 3, viewing only occupied nodes, illustrates the shallow spatial relation between I126 and his personnel. Actor I126 also has personnel more distant in the system but Figure 2 and 3 represents his “home base area“. On a global level his space is also central.

What type of information on interaction patterns from SNA could then be used in combination with SSA? The informative aspects of the modified graphs, combined with the values for each node, make the spatial perspective of interaction more understandable. For example, if an organization has a rigid formal organization a spatial structure enabling discreet movement might explain different interaction patterns. Another issue to be considered is what type of communication a building should facilitate in an open and decentralized organization.

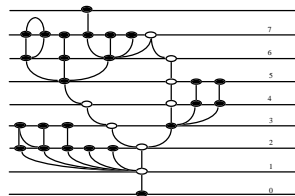
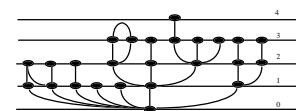


Figure 2. Modified graph including people in I126’s department. White dots are not occupied.

Figure 3. Modified graph for I126. Inter-



mediate spaces (corridors etc.) are omitted.

5. Conclusion

The results from the study indicate both possibilities and constraints of the methodological combination. Furthermore, the aspects of homology make further integration of SNA and SSA feasible. To develop new terms and tools for analysis is therefore on top of the research agenda. Results also have to be verified and evaluated and further empirical studies and tests of already obtained results have to be carried out.

An interesting issue, facilitated by the two methods, is to study the relation between the *global*, e.g. company or factory level, and the *local*, e.g. project team, group, department level. One question is if the social network is similar to the spatial network, what subgroups exist and how do they relate to the spatial structure. This might give additional information about knowledge dissemination and competence development between individuals, teams and organisations, an issue important to the field of organisational learning.

On a local level, organisations can be described by nodes in both methods and their relations evaluated. This could give further insight to how individuals interact in their workplace and the quality of this interaction. The combination of the results from both SNA and SSA, and new aspects derived out of the combination of the two methods, will raise new questions. A combined model also cope with other factors. New IT based communications systems, e.g. sometimes decrease the importance of physical distance.

There are also managerial implications. Management can with the support of a combined analyse acquire awareness of interaction patterns and they can more consciously influence the design of their organisational setting.

To conclude, the combination of SNA and SSA sheds new light on the physical setting and it's impact on communication within organisations. The results can support decision-making concerning the design of physical and social systems in which organisations act and perform. More research is needed, but the two methods described provide a framework for the development of knowledge and methods to support organisational performance.

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