

1 Introduction

1.1 Goal

Informal communication of knowledge is a critical factor for the success and failure of organizations. Recently, the importance of knowledge in organizational environments has been widely subject to research, strategies, solutions and discussions of what is known as “knowledge management”. With its initial emergence in the late 1980s, knowledge management has become a buzz phrase in the late 1990s. After the hype about knowledge management, the discussions have slowed down during the last years. Not only did the question arise, whether knowledge can be actually managed, but doubt has been cast on simplistic approaches, technical solutions and the contribution of knowledge management to the return on investment. This slow down provides the opportunity to take a closer look at the role and processes of knowledge in organizations, to undertake a more detailed analysis, and to offer more complex and (hopefully) more suitable approaches to deal with them. In this work, a close focus is put on the processes of knowledge generation through knowledge communication within and between organizations.

Studies into the informal structures within and between organizations from a network perspective are not a new invention. At the time the author started his research on methods and approaches to adopt social network analysis for knowledge management, literature and studies on this topic were rare, although discussed with other researchers and practitioners, publications on this subject were hardly to be found. Recently, social network analysis has become more widely recognized as a potential method to analyze, evaluate and influence knowledge generation processes. Various papers promote its potential usefulness as a knowledge management tool. This perception of social network analysis provides a new range of its applications. While social network analysis is conventionally used as a method of scientific research, these approaches propagate its usefulness for practical purposes of organizational design and strategy. But most of the recent approaches, that emphasize the practical adaptation of social network analysis, do not get beyond the description of its potential usefulness. The existing empirical applications are purely academic again.

The empirical applications provided in this study are taken from organizational practice itself. The case studies were undertaken due to concrete organizational needs, and their results were used to provide practical solutions for interventions

and follow-up activities. The guidelines to undertake an evaluation of the informal communication structures within a specific domain of knowledge aim at adopting the sophisticated methods of social network analysis for business practice.

In this study, the context of innovative knowledge generation in organizational research and development (R & D) environments is introduced very broadly with reference to the existing literature. The thesis argues that within this scope social network analysis proves useful both as a theoretical concept and a practical tool. From theoretical perspectives, the argumentation presented here pushes ahead the de-construction of the community concepts that have become popular in organization and business studies during the last decade. The author argues that the introduction of community concepts in organizational and business contexts is based on serious misconceptions of the core concepts of community and, therefore, community is not an adequate concept to analyze and design social processes of knowledge communication within and between organizations. As an alternative, the much more pragmatic approach of networks will be provided as a useful concept to grasp the social relationships between individuals as well as between social aggregates for conceptual and analytical purposes with striking simplicity.

After introducing the theoretical framework, the method of social network analysis is theoretically outlined, described for practical application, and empirically validated as an instrument and tool to analyze and facilitate organizational knowledge communication. To close the existing gap between the elaborated method for academic purpose and the potential benefits for organizational practice, the approach of social network analysis will be simplified and outlined according to its basic steps to match practical needs and illustrate its usefulness for business practice. Moreover, the outline of the method does not remain on a merely descriptive level but provides illustrative examples for interventions and follow-up activities to improve organizational knowledge generation and communication from the interpretations of its results. Thus, the action model developed here goes beyond the boundaries of a passive descriptive-analytical academic method toward an intervening active framework to shape the relationships of knowledge communication in organizations.

Last but not least, with this work the author provides a comprehensive reconstruction of the existing literature and research on social network analysis and the study of knowledge networks that is distributed in a variety of different articles and documentations.

1.2 Method

The systematic process of the study presented here consists of five different methodical steps (see also figure 1.1):

- step 1: theoretical problem definition;
- step 2: empirical exploration;
- step 3: model development;
- step 4: empirical evaluation of the model;
- step 5: assessment and modification of the model.

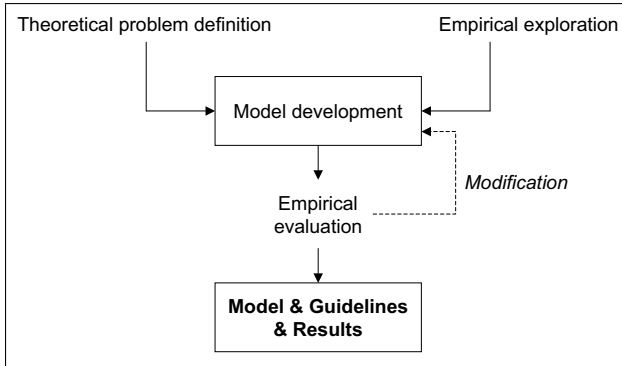


Figure 1.1: Overview Methodical Steps

Step 1 defines the subject of the work and the problems that should be addressed from a theoretical perspective. This is done through intensive study of theoretic approaches, existing empirical research, other publications and documentations, informal discussions at conferences and with colleagues and experts from academia and practice, who have a strong expertise in approaches and processes of knowledge generation and communication in communities, networks and organizations. The introduction of the theoretical background, especially through a review of literature (monographs, articles, papers), plays an important role to get an overview of the state of research and to outline the subject of this study from theoretical perspectives, to develop open questions or critical issues, and to focus on the central themes. In accordance with the qualitative paradigms in social science, it is of high importance to approach the subject of research with as much openness as possible. The principle of openness leaves theoretical structuration of the topic of research aside until it gets revealed through the subjects of research themselves (see Hoffmann-Riem 1980: 343; Lamnek 1989: 17-19). The theoretical draft of the research topic also prepares its empirical exploration in step 2.

Step 2 empirically explores the research topic that has already been theoretically outlined in step 1. The exploration tries to grasp the views, conceptions and genuine perspectives of experts on the research topic and with regard to the theoretical foundations of the method development. This is done through a 2-step

expert survey based on a structured questionnaire with open questions (see section 2.4.1 about the method in more detail).

Step 3 compares the theoretical outline of the research subject derived from step 1 with the results from the explorative interviews carried out in step 2. This procedure leads to the development of a method and guidelines to undertake social network analysis for purposes of organizational knowledge communication. The method development is part of an empirical case study (pre-test study) that was undertaken as a project co-operation with the Fraunhofer Institute for Production Systems and Design Technology (Fraunhofer IPK), Berlin (see section 5.4).

Step 4 gives an empirical evaluation of the method and guidelines developed in step 3. Results and insights gained from theoretical consideration, empirical exploration and the first case study are evaluated in a second case study (evaluation study) on entrepreneurial network evolution in the advanced training program “Entrepreneurship in the Knowledge Society” at the Freie Universität Berlin (see section 5.5). In a third case study (application study) the methodical process and selected measures are confronted with organizational practice. This case study is undertaken in the field of inter-organizational knowledge communication between the different research institutes of the Fraunhofer-Gesellschaft, a large German organization for contract research in all fields of the applied engineering sciences (see section 5.6).

Step 5 allows for the assessment and final discussion of the framework outlined above and the method developed within this framework. It provides the basis for further applications and possible modifications of them. This could be done through further theoretical considerations as well as through further case studies.

The overview over the basic steps of the study presented here, shows the basic resources that build the theoretical and empirical core of this work:

- a broad theoretical background that is derived from extensive study of the literature,
- different sources of profound empirical data collected by the author:
 1. reports of research, experiments, simulations and other studies from the literature and from current research,
 2. exploration of current research questions through a 2-step expert survey (see section 2.4.1) and paper presentations by the author and their informal discussion at conferences and meetings,
 3. development of the method in an empirical project (step 3, see section 5.4), and
 4. its evaluation and application in two subsequent case studies (step 4, see sections 5.5 and 5.6).

In summary, the research presented here is an exploratory-descriptive study. It is theoretical in that it provides a comprehensive outline of the existing approaches on social network analysis and the study of knowledge networks. At the same time, it is applied research in that it promotes social network analysis as a method for analysis and facilitation of knowledge communication in organizational practice.

1.3 Overview

Knowledge, communication and their social organization constitute the central points of reference to this work. Wersig (1996) identifies the first two aspects as being central to the analysis of the complexity of the knowledge (or information) society. Here, we add to our perspective the social organization as the structural environment for the communication of knowledge. Human action is always knowledge-based: “Social groups, social situations, social interaction and social roles all depend on, and are mediated by, knowledge” (Stehr 1999). Relationships between individuals as well as between social aggregates are based on knowledge. Taking this position as a starting point, the study is composed of three major blocks as presented in figure 1.2: (1) context and position (chapter 2), (2) conceptual framework and relevance (chapters 3 and 4), and (3) analytical method and empirical case studies (chapter 5).

Context and position of the study are introduced in *chapter 2*, starting with debates about the emergence of a knowledge society (section 2.1). Since knowledge as a subject of theoretical analysis as well as an empirical phenomenon is no less than complex, the next section aims at providing some kind of fundamental abstract on perceptions of knowledge (section 2.2) and constitutional conditions of knowledge management and its institutionalization from a sociological perspective (section 2.3). Results from an expert survey give empirical insights into today’s knowledge management practices and challenges, strengthening the primary role of knowledge communication and knowledge transfer as the focal point of organizational and inter-organizational knowledge processes (section 2.4). This chapter concludes with a basic overview over conceptual approaches of knowledge communication and management (section 2.5).

In *chapter 3*, the focus is put on communities and social networks, which provide the conceptual framework for the study of organizational knowledge communication. The first section of this chapter introduces theories of organizational communication with its emphasis on informal knowledge communication (section 3.1). The practical role of communities for knowledge communication in organizations is accentuated by the empirical findings of the expert survey that put a special focus on knowledge communities (section 3.2). Sociological perspectives and limits of the community concept are discussed by revisiting the classic

works and authors in sociology (section 3.3). Then, the next section highlights the concepts of knowledge communities, communities of practice, and knowledge networks from a comparative perspective based on the results of the expert survey (section 3.4). This discussion provides the background for a fundamental critique of the prominence of community concepts in recent knowledge management debates and the proposal for a more fruitful social network perspective on knowledge communication processes within and between organizations (section 3.5).

Since knowledge communication within and between organizations is a broad field of study, we narrow our perspective and put our focus especially on social networks and the generation of innovations in *chapter 4*. The generation of innovations in the knowledge society is explored within the theoretically and practically highly relevant field of organizational research and development (R & D) and with regard to the role of entrepreneurs as the drivers of innovation (section 4.1). Views of experts illustrate role and impact of knowledge management in R & D (section 4.2). The next sections focus on networks and knowledge communication in R & D environments and their role as intermediaries for the institutionalization of knowledge transfer (section 4.3 and 4.4). Making a digression on a prominent network concept, the generation of innovation through networking and the social capital of the entrepreneurial person is illustrated briefly (section 4.5). Finally, this chapter concludes with a discussion of the limits of the network concept (section 4.6).

Social network analysis as a knowledge management tool is presented in *chapter 5*. This chapter starts with an introduction of the approach of social network analysis, its basic definitions, network properties and structures (section 5.1). Then, method conceptualization and development of social network analysis as a knowledge management tool is outlined according to its aims and fields of applications with an additional focus on multi-level analysis (section 5.2). A guideline for social network analysis to leverage communication within and between organizations provides detailed steps for application (section 5.3). The practical value of social network analysis for analyzing and supporting intra- and inter-organizational knowledge communication is demonstrated by three empirical case studies:

1. a *pre-test study* on the identification of expertise and knowledge transfer (section 5.4) that was a small part of the project “Wachstum mit Wissen” (economic growth through knowledge), sponsored by the German Federal Ministry of Education and Research (BMBF), at the Fraunhofer Institute for Production Systems and Design Technology (Fraunhofer IPK), Berlin, in co-operation with the author at the Department of Information Science, Institute for Media and Communication Studies, Freie Universität Berlin;
2. an *evaluation study* on communication of knowledge and entrepreneurial network evolution (section 5.5), undertaken in the advanced training pro-

- gram “Unternehmertum in der Wissensgesellschaft” (entrepreneurship in the knowledge society), a project at the Freie Universität Berlin funded by the European Social Fund (ESF), that aims at transferring new insights into the knowledge society from academia to business practice for entrepreneurs;
3. an *application study* on inter-organizational knowledge communication (section 5.6), supporting the community building process for knowledge sharing within the domain of knowledge management between 17 research institutes of the Fraunhofer-Gesellschaft and its headquarters, a large German organization for contract research in all fields of the applied engineering sciences.

The final section of this chapter provides approaches to interpretations of network properties, structures, roles and positions and gives illustrative examples of interventions to foster knowledge communication and improve the flows of knowledge within and between organizations (section 5.7).

A conclusion is given in *chapter 6* with a synopsis of the study (section 6.1), its contributions to research (section 6.2), and an outlook over fields of further explorations (section 6.3).

Context and Position	<p style="text-align: center;">1 Introduction</p> <p style="text-align: center;">1.1 Goal 1.2 Method 1.3 Overview</p>	
	<p style="text-align: center;">2 Knowledge, Knowledge Society, Knowledge Management</p> <p>2.1 The Emerging Knowledge Society 2.2 Perspectives, Conceptions and Social Construction of Knowledge 2.3 Knowledge Management and its Institutionalization 2.4 Knowledge Management Practices and Future Perspectives 2.5 Communication and Management of Knowledge</p>	
Conceptual Framework and Relevance	<p style="text-align: center;">3 Communities and Social Networks in Organizational Knowledge Communication</p> <p>3.1 Organizational Knowledge Communication 3.2 Role of Communities for Knowledge Communication 3.3 Sociological Perspectives and Limits of Community 3.4 Knowledge Communities, Communities of Practice and Knowledge Networks 3.5 Social Network Perspective and Knowledge</p>	<p style="text-align: center;">4 Social Networks and the Generation of Innovations</p> <p>4.1 Generation of Innovations in the Knowledge Society 4.2 Knowledge Management in R&D 4.3 Networks and Knowledge Communication in R&D Environments 4.4 Institutionalization of Knowledge Transfer in R&D 4.5 Entrepreneurial Social Networks 4.6 Limits of the Network Concept</p>
	<p style="text-align: center;">5 Social Network Analysis as a Knowledge Management Tool</p> <p>5.1 Introduction to Social Network Analysis 5.2 Social Network Analysis as a Knowledge Management Tool 5.3 Application of Social Network Analysis as a Knowledge Management Tool 5.4-5.6 Case Studies 5.7 Leveraging Knowledge Communication Networks</p>	
Analytical Method and Empirical Case Studies	<p style="text-align: center;">6 Conclusion and Outlook</p> <p style="text-align: center;">6.1 Synopsis 6.2 Research Contribution 6.3 Further Research</p>	

Figure 1.2: Overview Conceptual Structure