



The key roles in the informal organization: a network analysis perspective

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Abstract

Purpose – The purpose of this paper is to identify the key roles embedded in the informal organizational structure (informal networks) and to outline their contribution in the companies' performance. A major objective of the research is to find and characterize a new key informal role that synthesises problem solving, expertise, and accessibility characteristics.

Design/methodology/approach – A framework for an in-depth informal structure analysis based on social network analysis (SNA) methodology is structured and applied in a case study of a knowledge-based enterprise operating in the information systems industry.

Findings – The paper identifies and characterizes the key informal roles (namely opinion leaders, central connectors, bottlenecks, experts, consultants, or helpful people) and a new one, called *pilus prior* (first lancer) that synthesises problem solving, expertise, and accessibility characteristics.

Research limitations/implications – Future research will move through the enlargement of the sample that will allow a better generalization of the results and the development of a model to quantitatively evaluate the performances of individuals recognized as informal leaders.

Practical implications – The proposed framework has a general applicability and can be a valuable tool for an in-depth organizational analysis based on SNA methodology. Consequently, some directions are provided to increase cooperation and knowledge sharing flows inside the company and to align the formal organizational processes to the informal one.

Originality/value – The results of the research have been achieved by using an original approach, the joint analysis of three informal networks. The case suggests that *pilus priors* are the informal emerging leaders in the company who outperform their colleagues.

Keywords Networking, Social networks, Organizational structures, Company performance

Paper type Research paper



1. Introduction

The fundamental role of informal relationships inside an organization has been widely recognized in organizational studies. As a matter of fact, the concept of informal organization was, historically, conceived in the “human relations school” founded by Mayo (1933) and deepened by Barnard (1938), Roethlisberger and Dickson (1939), and Argyris (1957). Simon (1976) revised this concept stressing the relationship with the formal organization and studying the emerging of roles within an organization. These informal roles have a great influence on the operative and the decision-making processes and on the knowledge/know-how sharing inside companies.

Recently, some scholars and consultants have addressed their studies on the analysis of informal organizational networks, which are “the networks of relationships

that employees form across functions or divisions to accomplish tasks fasts” (Krackhardt and Hanson, 1993, p. 104). The dynamic and rapidly changing business environments and the changes in the managerial approach which took place since the 1980s (inclination to team work, continuous improvement projects, creation of joint ventures, strategic alliances, integrated supply chains, etc.) contributed to knock down the barriers obstructing communicational flows (Cross *et al.*, 2002b). In such contexts, the informal structure becomes particularly important due to its flexibility and dynamism (Cross *et al.*, 2001). Inside an organization, the activities and the work processes coordination principally occur through informal relationships rather than through the formal structure (Cross *et al.*, 2002a; Cross and Parker, 2004; Morton *et al.*, 2004). Nevertheless, it is also clear how these relationships are invisible in the standard representations of formal organizations (e.g. organization charts).

Social network analysis (SNA) is the fundamental methodology used to analyse, to visualize and to manage these invisible informal networks. The interest of management in SNA derives from some research which used this methodology and demonstrated the strong impact of informal structures both on individual performance (Brass, 1984; Burt, 1992; Krackhardt and Brass, 1994; Cross and Cummings, 2004), internal organizational network performance (Krackhardt and Hanson, 1993; Cross *et al.*, 2002b; Cross and Prusak, 2002), and external organizational network performance (Mizruchi and Galaskiewicz, 1994; Bouty, 2000; Baker and Faulkner, 2002).

The aim of our research was to identify the key roles embedded in the informal organization and to outline their contribution in the companies’ performance. Above all, a major objective of our research was to find and to characterize a new key informal role that synthesises problem solving, expertise, and accessibility characteristics. So we performed an in-depth analysis of the informal structure of a group of companies operating in the information systems industry, the Euris Group.

The remainder of the paper is organized as follows. First, we propose a general framework for the analysis of informal networks, the SNA measures (Section 2) and the research methodology applied in the case study (Section 3). Subsequently, the analysis of the informal structure of the Euris Group is discussed (Section 4). The discussion is focused on the comprehension of the informal organization and of the key informal roles, and on the identification of a new one we called *pilus prior* (first lancer), a roman legionary seen as a leader on the field by his companions-in-arms. Finally, we provide some suggestions to enhance knowledge sharing flows and to align the formal organizational processes to the informal one based on the results of the in-depth analysis of the case study’s informal organization.

2. A framework for the informal networks analysis and the identification of key informal roles

Even if affected by the formal structure representing the skeleton, the performances of organizations are determined by the informal structure. This is the real central nervous system, which drives the collective process, the actions, and the relationships inside business units (Krackhardt and Hanson, 1993).

SNA, i.e. the process of mapping and measuring social relationships among social entities (Wasserman and Faust, 1994), attempts to visualize the invisible informal structure and to assess whether this structure suits the organization goals in order to improve organizational performances by studying how the access and the sharing of

information and knowledge can be promoted. Consequently, the objectives of an informal network analysis within an organization concern the support to:

- integration and efficient cooperation among strategic groups;
- integration and efficient cooperation within strategic groups; and
- key roles.

So the objects of the analysis should be:

- the distribution of relationships among homogeneous groups of actors;
- the distribution of relationships within homogeneous groups of actors; and
- the key actors.

In order to identify both key actors and homogeneous groups and to analyze their relationships, Cross *et al.* (2002a) suggested to study five informal organizational networks (containing three networks previously proposed by Krackhardt and Hanson, 1993):

- (1) *Communication network*. Network of working and not-working information within the organization.
- (2) *Information network*. Network of working communications within the organization.
- (3) *Know network*. Network of knowledge within the organization, describing how knowledge and expertise are spread.
- (4) *Problem solving network*. Network of advice relationships within the organization which allow to solve working issues.
- (5) *Access network*. Network of accessibility to knowledge within the organization.

The five informal networks can be split into two classes: non-working domain and working domain.

With reference to the communication network, it is possible to focus on friendship and trust relationships among people interacting and exchanging information which belong to the non-working domain. Individuals in these networks, i.e. the opinion leaders, have a strong ability to interact with others. These charismatic people can influence the attitude of other workers towards organizational changes (Krackhardt, 1992) and act as information brokers among strategic groups (Smith, 2005). This last role was identified by Cross and Prusak (2002), who recognized three other key roles within companies or within groups, which were established spontaneously or by formal constraints:

- *Central connector*. Who connects many people in an informal network?
- *Boundary spanner*. Who connects an informal network to other groups or people?
- *Information broker*. Who supports the information exchange among groups?
- *Peripheral specialist*. Who provides specific knowledge, but is peripheral in the information network?

The working domain is identified by the remaining four networks among which the information network is the widest. In particular, as shown in Figure 1, the information

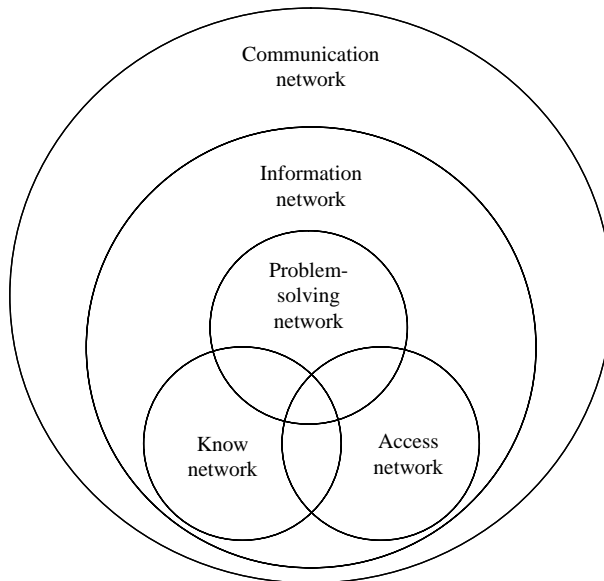


Figure 1.
Intersection of the five
informal networks

network contains the problem solving, the know and the access networks. The joint network among these last three is not identical to the information network.

Starting from the five informal network model proposed by Cross *et al.* (2002a) we have structured a general framework for conducting an informal network analysis (Figure 2) in which the objectives and the objects, the networks, the key roles and the measures are summarized. The central actors in these five networks are people with endowment like leadership and capabilities, i.e. expertise and problem solving abilities, recognized by others colleagues. These people assume key informal roles within the organizations, whose characterization was the first objective of our research.

The five networks have been chosen because they allow the analysis of the three informal relationships (problem solving, expertise, and accessibility) required to identify the key role that was the major objective of the research. This key role is played by those people who are contemporaneously recognized as problem solvers, experienced, and accessible by their colleagues. Beside the study of single networks, jointly different social networks may be the topic of further analysis, which would help to better understand the dynamics regulating informal relationships within organizations. So we added a sixth network which could be created by intersecting the problem solving, the know, and the access networks.

The fundamental measures of the SNA we used in our framework are explained in Table I.

The most common measure is centrality due to its efficacy in analyzing the power of an actor within a network. There are two types of centrality: the first one concerns single actors within a network, while the second one, called network centralization, refers to the whole network.

The centrality degree depends on the network dimension so it can be useful to compare different networks by dividing it by the total number of nodes. The centrality

Figure 2.
Framework for the
informal networks
analysis and the
identification of key
informal roles

Objectives of the analysis												
		Analysis of the relationships within groups/departments				Analysis of the relationships among groups/departments				Identifying key roles		
Object of analysis	Informal networks	Distribution of non-working relationships	Distribution of working relationships	Distribution of knowledge	Distribution of non-working relationships	Distribution of working relationships	Collaboration among departments/business units	Identifying homogeneous informal groups	Boundary spanner	Central connector	Information broker	Peripheral specialist
		Mean centrality degree + network centralization			Mean centrality degree + network centralization			Cluster analysis			Betweenness (OPINION LEADER)	
Communication network			Mean centrality degree + network centralization and density			Mean centrality degree + network centralization and density	Mean centrality degree	Cluster analysis	Centrality degree (CUT POINT)	Centrality degree "In degree" (BOTTLENECK)	Betweenness	Closeness
Information network				Mean centrality degree + network centralization						Centrality degree "In degree" (EXPERT)		
Know network				Mean centrality degree + network centralization						Centrality degree "In degree" (CONSULTANT)		
Problem-solving network				Mean centrality degree + network centralization			Cluster analysis	Cluster analysis		Centrality degree "In degree" (HELPPUL)		
Access network								Cluster analysis				
Problem-solving X access X know network							Cluster analysis	Cluster analysis		Centrality degree (PILUS PRIOR)		

Name		Network measures	Key roles in the informal organization
Centrality degree		A node is locally central if it has many ties to other actors in its surroundings (Nieminen, 1974)	91
In degree		Number of edges coming into a node in a directed graph	
Out degree		Number of edges going out of a node in a directed graph	91
Cut point		A node is a cut point if the number of graph components without it is smaller than the number of components with it	
Betweenness		Centrality based on the frequency with which a node falls between pairs of other points on the shortest or geodesic paths connecting them (Freeman, 1979)	Table I.
Closeness		Centrality based on the sum of the geodesic distances from that node to all other nodes (Sabinussi, 1966)	
Network centralization		Degree to which a network is centralized around one or few actors (Scott, 1991)	Network measures in the framework
Density		Ratio between the number of edges and the potential number of edges in a graph	
Clusters		Actors grouped by structural equivalence, high density, or closeness criteria	

degree is a local measure (Kilduff and Tsai, 2003) that considers only an actor in its surroundings. Instead betweenness and closeness are two global measures of centrality which highlight the strategic position of an actor within the communication flows: people with high betweenness could influence a group by keeping or distorting information, while people with high closeness have a strategic position because they are the “closest” ones to the others.

The network centralization highlights the graph organization around its central node. Networks with high-centralization values (near 100 percent) are systems where information flows tend to concentrate in a single person; on the contrary, if the value is low, the relationships are distributed more homogeneously.

3. Informal network analysis: the Euris Group case study

In the research, we focused on an in-depth analysis of the informal structure of a group of companies by using the SNA methodology and framework described in the previous section (Figure 2). The Euris Group has been selected for its belonging to the knowledge-intensive industry; in fact, in these contexts, informal structures, and informal relationships play a fundamental role in achieving strategic and operative goals (Burt, 1992; Wang and Pervaiz, 2003). A proper HR management, in terms of accessing and sharing of the knowledge flows, is fundamental for these type of companies.

3.1 The Euris Group case study

The Euris Group was founded in 1989. It has six business units, operating in different market areas and located in four different Italian cities, named: Solutions, Gesta Consulting, Eidos, Progetti, and Cores, which is the administrative unit. The Euris business unit is solely represented by the chief executive officer (CEO). The Euris Group operates in the information technology market, offering software services, and solutions to medium and large manufacturing enterprises, banks, local public authority, and multi-utilities companies.

Until the end of our research the number of employees was 192: 102 in Euris Solutions, 26 in Gesta Consulting, 20 in Progetti, 18 in Eidos, and 25 in Cores.

3.2 Steps of the Euris Group case analysis

The literature analysis conducted on SNA allowed us to identify some similarities among different SNA processes. The differences among the steps only concern two aspects: the data gathering and the analysis objective. The SNA conducted was organized in six core steps and a preparatory step (Figure 3).

Preliminary step: presentation of the analysis process. First of all, we presented the analysis process, the achievable objectives and the efforts required to the top management. The goal of this pre-step was to involve the top management both directly (in defining the research objectives and in gathering structured data) and indirectly (in sponsoring the research to the other actors involved).

Step 1. Definition of the objectives of the analysis. In step 1, we defined the objectives of the research:

- to understand the real informal organizational structure;
- to identify and characterize the key informal roles;
- to identify a new key informal role from the joint analysis of the intersection of the problem solving, know network and access network; and
- to suggest interventions to enhance the dissemination of knowledge within and among strategic groups.

Step 2. Definition of the objects of the analysis. Once the research objectives were defined, we selected the objects of the analysis and the suitable measures to be used. It is important to well define the general and specific objectives of the analysis and the actors and relations that will be studied for each of the informal organizational networks because the analysis process requires a high investment in terms of time both from the company and the research team.

Step 3. Data gathering. There are three techniques of data gathering which are generally used in SNA: participant observations, interviews, and questionnaires. In our research we used questionnaires, in order to measure the relations among actors, and semi-structured interviews. We developed an electronic questionnaire in Microsoft

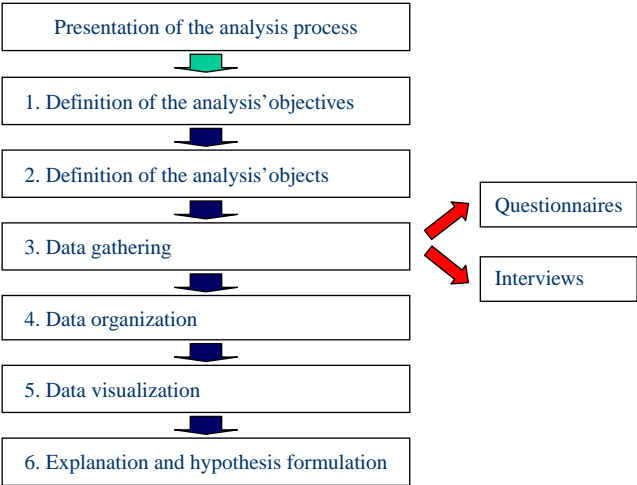


Figure 3.
Steps of the SNA
methodology in the
Euris Group

Excel[®] because each employee uses a PC. Nevertheless, the electronic data gathering simplified the data management. We submitted to each employee ten questions subdivided in five groups, accounting for the five networks. Hereunder follow some of these questions:

- *Communication network.* Specify with whom you speak about every private topic, both personally and by telephone.
- *Information network.* Specify with whom you speak about work topics, both personally and by telephone.
- *Know network.* Specify who you consider those most qualified about your work issues.
- *Problem solving network.* Specify with whom you speak in order to receive information about new issues concerning your work activities.
- *Access network.* Specify with whom you speak in order to solve a problem, knowing he/she will give you enough time.

In developing the questionnaire structure, we paid particular attention to the easiness and quickness in answering so we grouped the workers by business unit and alphabetical order. We measured the relationships direction and strength. So we asked respondents to weigh their relationship with colleagues referring to the frequency and to the level of expertise (in the know network). We assumed that the relationship between actors exchanging information daily is stronger than the relationship between actors interacting weekly or monthly.

Finally, we administered the questionnaire to each employee (192 people) and successively we received all the questionnaires filled in (100 percent). Therefore, it has not been necessary to sample the population.

Step 4. Data organization. The data gathered through the questionnaire were organized in adjacency matrixes, where rows and columns reported the names of each employee. The values in the cells indicate the presence and the strength (e.g. in terms of frequency) of the relationships among the actors.

Step 5. Data visualization. Starting from the adjacency matrixes related to the five informal networks, we calculated the measures mentioned above according to the objectives stated. In particular, we used one of the most common software for network analysis: UCINET 6[®] (Borgatti *et al.*, 2002). Moreover, we used NetDraw[®] to visualize the networks.

Step 6. Explanation and hypothesis formulation. The study of informal organizational networks using the SNA methodology aims at achieving three objectives:

- (1) theory building;
- (2) theory testing; and
- (3) the improvement of informal structures performance.

In theory building, the objective is to gather and analyse information in order to find general models of social interactions. In theory testing, SNA is used to describe the structure of one or more observed networks and to test it as hypothesis (Burt, 1982). Finally, SNA can be used as a diagnostic tool to improve informal structures, by eliminating the weaknesses detected (Krackhardt and Hanson, 1993).

94

4. Research results and discussion

4.1 Communication network

Individuals with central positions in the communication network are the opinion leaders. This characterization is particularly referred to trust and friendship ties. These individuals have a great ability to interact with the others. Moreover, the identification of homogeneous groups can be very important, especially when the company is facing changes. In fact, we can find a common attitude within networks in dealing with changes. In Figure 4, the communication network by Progetti and Eidos is shown.

The comparative analysis of the two networks allows to make some interesting remarks. By comparing the network centralization, it emerges that the structures are very different. As mentioned below, network centralization indicates the distance from a star configuration. The higher the network centralization is, the more the network is organized around one point. The network centralization for Progetti is equal to 44.44 percent while for Eidos it is 60.29 percent. This means that within Eidos there is an opinion leader, Berislav, while in Progetti it is not possible to identify any opinion leader. Table II shows the number of ties among the eight most central people. In Progetti, the centrality degree for the first individual (Luigi) is not very different from the second individual (Marzia). On the contrary, in Eidos, Berislav has a much higher centrality degree than Adriana.

4.2 Information network

Individuals with central positions in the information network play an important role in the working domain, as they are the central connectors of the working flows. However, they could also act as a bottleneck slowing down and reducing the efficiency both in the operative and decision-making process. Table III shows the analysis of the information flows with reference to the information network of the Euris Group. The table resumes the data about the network centralization and the mean centrality degree.

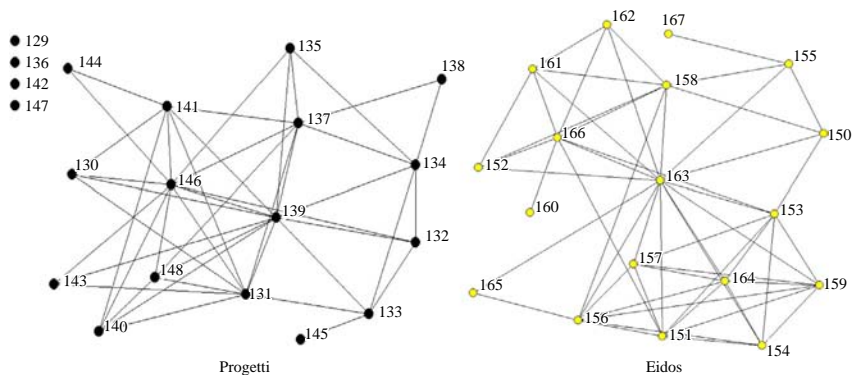


Figure 4.
Communication network

Name	No.	Centrality degree
<i>Progetti</i>		
Luigi	139	12
Marzia	146	11
Giovanni	131	9
Luca	137	8
Paolo	141	7
Vincenzo	134	6
Stefano	133	5
Marco	140	5
<i>Eidos</i>		
Berislav	163	15
Adriana	151	8
Damir	153	8
Alen	156	8
Marko	158	8
Daniele	166	8
Ksenija	159	7
Tatjana	164	7

Key roles in the informal organization

95

Table II.
Centrality degrees in the communication network

Company	Network centralization (%)	Mean centrality degree
Cores	36.29	13.640
Solutions	36.49	6.510
Eidos	66.44	6.333
Progetti	66.48	6.000
Gesta	80.00	5.679

Table III.
Network centralizations and mean centrality degrees in the information network

The most efficient information flow is the one in Cores: as a matter of fact, the average number of ties is high, the network centralization is rather low, and, therefore, the information is homogeneously spread among actors. On the contrary, in Gesta the network centralization is higher whilst the mean centrality degree is lower than in Cores. Figure 5 shows the Gesta information network with a monthly frequency.

In Figure 5, it is possible to observe that Andrea (actor No. 120), the only senior executive in Gesta, is very central in the network, if compared to other actors. Indeed, the network centralization is 80 percent. Such a case has two important implications:

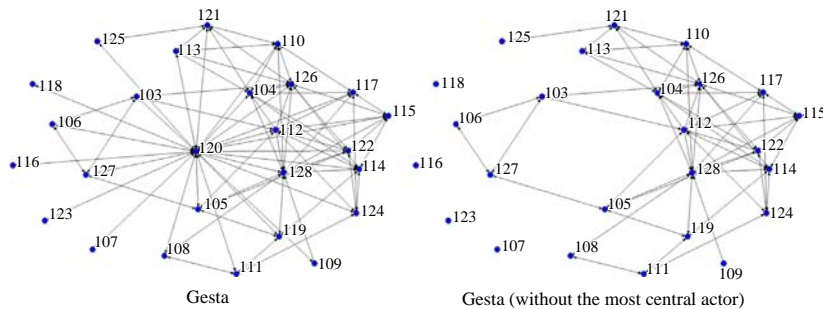


Figure 5.
Information network

- (1) Andrea is a bottleneck in the working information flows and slows down the entire network.
- (2) The strong dependency of the network on one person is dangerous, as in his absence, the information flow is considerably reduced. As a matter of fact, if the central actor would be removed, the density would be reduced by 27.77 percent and four people would be isolated.

According to these observations, in the Gesta case it would be appropriate to enhance the efficiency of the information flows through some organizational interventions, which are discussed as follows.

4.3 Know network

The know network shows how knowledge is distributed and used, in order to identify the most competent and experienced actors according to their colleagues, i.e. the experts. The analysis identifies individuals who are potentially qualified to hold important positions in the company and the so-called peripheral specialists. In both cases, they are experts, but a peripheral specialist is characterized by a low closeness in the information network. In Figure 6, the know network of the Euris Group is shown. The ties direction means that an actor is deemed to be qualified by colleagues.

As shown in Table IV, colleagues estimated that Egisto (No. 149), Luigi (No. 139), and Antonina (No. 71) are the best qualified and most experienced individuals. It is interesting to note that all of them are managers of three different business units.

In analyzing the know network, people with low “in degree” are not necessarily the least qualified. In fact, it is possible that their colleagues ignore their abilities and, therefore, consider them as non-skilled people.

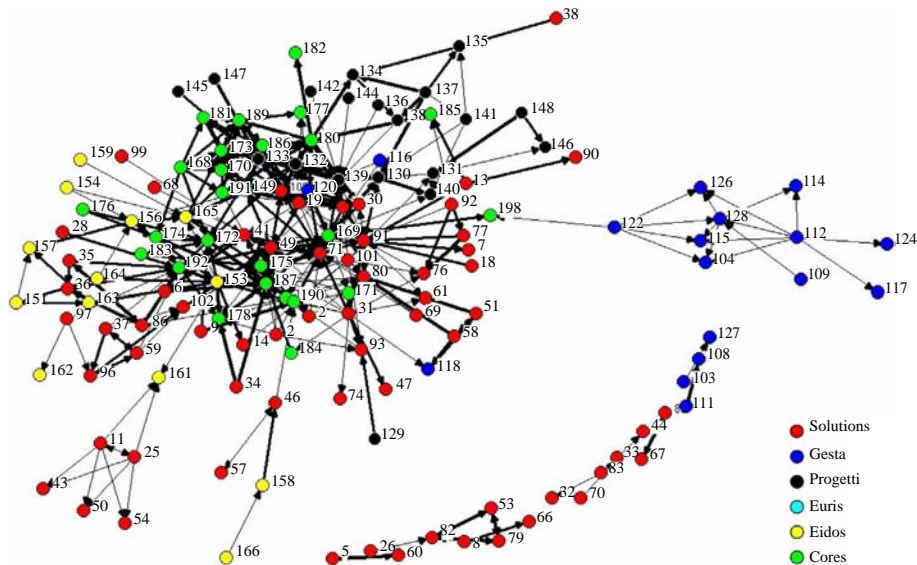


Figure 6.
Know network (Euris
Group)

Source: A full colour version of this figure is available on request from the corresponding author

Name	No.	Centrality degree
<i>Euris Group</i>		
Egisto	149	33
Luigi	139	31
Antonina	71	27
Fabio	175	24
Alessandro	187	24
Luca	91	22
Stefano	100	22
Sergio	192	22
Luisa	169	21
Massimo	172	20

Key roles in the
informal
organization

97

Table IV.
Centrality degrees in the
Know network

4.4 Problem solving network and access network

Those individuals who are central in the problem solving network are thought to be the best work-related problem solvers by their colleagues, i.e. the consultants. These individuals act as informal consultants and are legitimated by the opinion of their colleagues. Advice ties are knowledge exchanges based on trust. The analysis of the problem solving network allowed to identify the best qualified individuals to solve work-related problems, but they are not always accessible. Therefore, it is important to analyze the access network, representing the accessibility to different actors.

Those individuals who are central in the access network are thought to be the most accessible by their colleagues, i.e. the helpful people. Individuals placed in peripheries are less accessible than their colleagues. In fact, people not always have enough resources (e.g. time) to create ties with others. As a matter of fact, an individual recognized as very qualified by his/her colleagues can be inaccessible. This situation is a signal of inefficiency for the network because the abilities owned by these individuals cannot be exploited in case of need.

Generally, people less accessible are on top of the hierarchy and often correspond to the managers upon whom important decisions depend. In the case study analyzed, Egisto, the CEO retains the top position in the know network and is therefore considered as the most experienced in the Euris Group. However, he only retains the fifth position in the access network.

4.5 The pilus prior key informal role

Interesting remarks have been derived by the joint analysis of the problem solving network, the know network and the access network. This allowed us to identify a new key informal role assumed by individuals who are contemporaneously problem solvers, experienced, and accessible.

If neither an expert nor a problem solver are available, they are obviously not able to influence network performances. Similarly, accessible and experienced individuals, who are not problem solvers, are not able to help their colleagues. In fact, there is a significant difference between the ability to solve problems and the experience. An individual who is very skilled in one subject might not be able to profitably interact with his/her colleagues in order to solve a problem. On the contrary, a qualified individual might fulfil a task thanks to his/her relational qualities which allow him/her to collect the necessary information.

In order to identify this new leading key role in the company hierarchy, we apply an original approach by studying the intersection of the problem solving, the know and the access networks. We multiplied the three networks in order to study their intersection. In this way, if a relationship between two actors is null in one network – which means that it does not exist – the relationship between these actors is also null in the final network. In Figure 7, the final graph is shown, which results from the intersection of the three networks considered. The lines showing different ties display a greater or lower thickness according to their strength.

In the graph shown in Figure 7, some groups which are not connected with the remaining part of the network (right sector) can be identified. As far as single actors are concerned, the most qualified, helpful, and able to solve problems can be identified.

Table V shows the nine actors with the maximum centrality degree, the company and the role. Five of them (Luigi, Stefano Z., Antonina, Egisto, and Stefano C.) are senior executives. This is a positive fact, because they are properly recognized as experts and still accessible, even though they retain a high hierarchic position. It is not surprising that Alessandra and Elena are in central positions (Elena retains the top position) because they belong to Cores and they work in the administrative department. However, their colleagues consider them as qualified and problem solvers. Surprisingly, Massimo, and Alessandro, who are actors without a leading role in the company, are in a central position in the network because their colleagues rely on them. They are workers who jointly own three qualities which make them the talented individuals inside the company. Their informal role is a synthesis of problem solving, experience and accessibility. We named this role *pilus prior* (first lancer).

The *pilus prior* was a roman legionary seen as a leader on the field by his companions-in-arms. He commanded a roman cohort, coordinated his companions

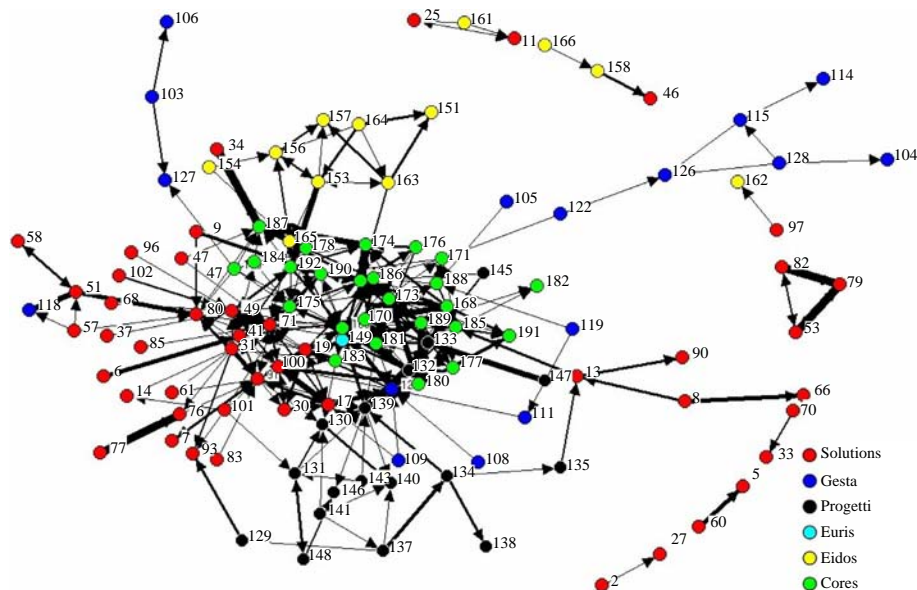


Figure 7.
Intersection among
problem solving, know,
and access networks

Source: A full colour version of this figure is available on request from the corresponding author

Name	No.	Centrality degree	Company	Role
<i>Euris Group</i>				
Elena	173	86	Cores	Administrative manager
Luigi	139	81	Progetti	Senior business executive
Alessandro	187	76	Cores	Senior programmer
Massimo	172	67	Cores	Senior systems analyst
Stefano	100	63	Solutions	Senior business executive
Antonina	71	55	Solutions	Senior technical executive
Alessandra	170	55	Cores	Human resources manager
Egisto	149	54	Euris	CEO
Stefano	133	51	Progetti	Senior business executive
Luisa	169	51	Cores	Project manager

Key roles in the
informal
organization

99

Table V.
Centrality degrees in the
intersection among
problem solving, know
and access networks

during battles, made himself accessible to them and offered rapid solutions to unexpected criticalities. This role can be compared to the center in basketball.

He/she assumes the important role of “informal” manager and leader inside an organization. A fundamental aspect is that this leading role emerges from the working domain and it is informally recognized by the other colleagues. The results of the analysis has been confirmed by interviews to the management, which have highlighted that *pilus priors* outperform other colleagues in the quality and the quantity of their work and, in general, the performance of their working activities are higher.

4.6 Actions for improving cooperation and knowledge flows efficiency

The in-depth informal structure analysis of the case study based on the proposed framework allowed us to put forward some suggestions that can improve the efficiency of the Euris Group’s organizational processes, but are more generally valid for any company. These corrective actions should help the company to promote knowledge sharing and align the formal processes to the informal one.

Corrective interventions aim at enhancing informal networks performance need to be planned according to the objectives initially defined from the requirements of the organization and to the real situation resulting from the analysis. As a matter of fact, there are actions suitable to the informal structure of every company while others must be studied *ad hoc*. The same network configuration could be positive or negative. For instance, a low cooperation between two business units can be negative, if it requires high interaction; on the contrary, if the company strategy does not require high cooperation between such business units, the situation identified is the best in terms of efficiency, due to the correct use of resources used in keeping relationships.

Any intervention can be made at a single actor level or at the whole network level, even if intervention at one level would have a considerable impact on the other.

At the single actor level, we suggest corrective actions concerning opinion leaders, bottlenecks, and isolated actors:

- *Bottlenecks*. Consider the case of Andrea, the bottleneck of the information network in Gesta. He is thought to be very skilled but is not accessible (in fact he is not a *pilus prior*); individuals considered to be experienced by their colleagues are often overloaded with work and therefore “overused”. It is necessary to identify when these individuals are indispensable because of the skills required

and when it is possible to delegate their activities to others. In the particular case of Andrea, it is advisable to verify if the requests to him are consistent with his abilities and his availability. If some requests are not consistent, they should be delegated to other individuals. This allows Andrea, the bottleneck, to concentrate on the relationships which require higher levels of skills. If activities cannot be delegated, it is necessary to grant him the support of a collaborator belonging to the same hierarchic level. This should help to speed up the problem solving process and enhance the efficiency of the company information flows.

- *Opinion leaders.* They are individuals with particular personal qualities which make them a point of reference to others (e.g. Berislav). When organizational changes occur, the opinions and attitudes of these individuals are particularly important, since they can influence, even unintentionally, the judgments of their colleagues. Top management should know how to deal with them, according to their impact on the whole network.
- *Isolated actors.* The reasons why an individual is in an isolated position in the network can be various. The actions must identify the causes in order to remove them. If an individual is isolated because he/she is not able to integrate himself/herself into the workplace, it should be advisable to involve him/her in different projects, in order to support the creation of ties to other actors of the work team. Isolation could be also caused by a lack of cognition of others' abilities. In this case, it is advisable to create a database of skill profiling. Otherwise, it is possible to set periodical meetings where each worker describes the activities on which s/he is working on.

At the network level the first step is the identification of the areas in which the effect would have a positive impact on organizational performance; this should optimize the use of limited resources, in primis time. In the Euris Group, we suggested to set periodical meetings in order to share information about the projects developed by each group. The groups can be created by using resources coming from different work-situations and formulating common management objectives.

Some months after the accomplishment of these corrective actions, the SNA should be repeated, in order to assess the efficacy of the actions and identify the dynamics of the informal structures. Indeed, informal networks can rapidly change their structures. As a consequence, it is useful to repeat the analysis with a planned schedule. This allows for monitoring the relationships within groups accurately and with up-to-date information.

5. Conclusions and practical implications

The research focused on the in-depth informal structure analysis of a case study of a knowledge-based enterprise operating in the information systems industry applying the SNA methodology. Starting from the five informal network model proposed by Cross *et al.* (2002a), we structured a general framework of analysis which allowed us both an analysis of the informal organizational structure (informal networks) and both the identification and characterization of the key informal roles within companies and among companies of the Euris Group, namely opinion leaders, central connectors, bottlenecks, experts, consultants, or helpful people.

A major objective of the research was to identify a new key informal role, which we called *pilus prior* that synthesises problem solving, expertise, and accessibility characteristics. The objective has been achieved by using an original approach, the joint analysis of three informal networks. The case suggests that *pilus priors* are the emerging leaders in the company and outperform their colleagues by assuming the leading role of “informal manager” recognized by their group, by informally coordinating the activities and transferring their expertise to unskilled colleagues. Furthermore, the *pilus prior* value could be used as an indicator for a “bottom up” evaluation of the employees.

Certainly, the mapping and analysis of the informal networks have practical implications for a company. The management’s objective must be to better comprehend the invisible relationships which improve (or worsen) cooperation and knowledge sharing and also enable a more efficient and effective management of operative and decision-making processes. The framework we structured for our research has a general applicability and can be a valuable tool for an in-depth organizational analysis based on SNA methodology. As a matter of fact, only an in-depth analysis of the informal relationships’ structure can identify the invisible criticalities and the strong/weakness points inside the organizations making the corrective interventions consistent to companies’ improvement goals.

Our future research will move through two paths: the first concerns with enlargement of the sample that will allow a better generalization of the results, while the second concerns the development of a model to quantitatively evaluate the performance of individuals recognized as informal leaders.

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Key roles in the
informal
organization

103
