Issue-based nets: a methodological approach to the sampling issue in industrial networks research

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Abstract

Connectedness is a central characteristic of industrial networks with significant methodological implications. One of the most important implications has to do with the choice of the sampling unit. This paper introduces the concept of an issue-based net and suggests its use as a unit of analysis in networks studies. An issue-based net can be defined as a net of relationships amongst actors who are concerned with a particular issue through mutual or conflicting interests. Using a research project on the dynamics of the port wine industry in Portugal, the paper elaborates on the use of such a sampling unit as a way of understanding processes of change mainly driven by interaction amongst groups of interests.

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Umberto Eco's *The Name of the Rose* is a thriller about a series of murders in a medieval monastery. After the suspicious burning of the abbey's library, Brother William of Baskerville, a learned Franciscan, commented on the event with Adso, his young novice assistant:

> "It was the greatest library in Christendom", William said. "Now", he added, "the Antichrist is truly at hand, because no learning will hinder him any more. For that matter, we have seen his face tonight".
>
> "Whose face?" I asked, dazed.
>
> "Jorge, I mean. In that face, deformed by hatred of philosophy, I saw for the first time the portrait of the Antichrist, who does not come from the tribe of Judas, as his heralds have it, or from a far country. The Antichrist can be born from piety itself, from excessive love of God or of the truth, as the heretic is born from the saint and the possessed from the seer" (Eco, 1983, p. 491).

The Antichrist who Brother William was referring to was Father Jorge of Burgos, the censor of heretical literature. Father Jorge was convinced that since there was only one single truth, knowledge was something that could not (or should not!) be furthered, only refined. Such a perspective clearly conflicts with the scientific thinking as we conceive it nowadays. As Ackroyd and Hughes (1981, p. 13) put it, "... scientific thinking has institutionalized the idea that knowledge has to progress and can do so only through research". There is, however, one basic requirement: the researcher must explain and justify how he or she has carried out the study so that the others can confirm or reject his or her conclusions. In other words, the use of an appropriate methodological approach is, to some extent, the seal of guarantee of any scientific work.

In industrial networks studies the choice of the sampling unit has been a key methodological issue since it is closely related to a central feature of any network: its connectedness character. Apparently, such a connectedness character should call for holistic approaches which took as sampling units large networks or even the overall network. Nonetheless, studying a single large network is, in general, an extremely complex task, if not impossible in most cases. For this reason network studies have usually adopted smaller sampling units such as focal organisations, dyads or small nets. However, this option is not free of problems since the smaller the sampling unit is, the more the connectedness character is lost.

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The objective of this paper is to introduce an intermediary option between these two alternatives: the issue-based net. A research project on the dynamics of the port wine industry in Portugal will be used to illustrate the concept of issue-based net as well as its use as a sampling unit. The paper is divided into five sections. The first addresses the notion of an issue-based net as well as its methodological importance. The section which follows elaborates on some of the most relevant factors which determined the methodology and research methods adopted in that research project. The third section analyses three issue-based nets in the context of the port wine industrial network. The next section, addressing the data collection process, pays a special attention to the sampling issue. The last section offers a brief overview of data analysis.

Issue-based nets

An issue-based net constitutes a form of association mainly based on cooperative relationships amongst actors who aim to cope with a collectively recognised issue by influencing the structure and evolution of the system(s) to which they belong through an increased control over activities, resources and/or other actors. The roots of this concept can be found in three streams of research: policy networks studies (cf. Marin and Mayntz, 1991; Scharpf, 1993), organisation and marketing studies (cf. Nohria and Eccles, 1992; Iacobucci, 1996) and management studies (cf. Dutton and Webster, 1988; Dutton *et al.*, 1997).

An issue-based net may aggregate mutual interests of various types of actors through processes of interaction and exchange – e.g. social, economic, or political – whose objective is to cope with a collective issue by changing (or preserving) the shape of the network where its members are embedded. In this paper, the term "network" refers always to the overall network of relations in a particular industry. The term "net" refers to a subset of the overall network. This means that an issue-based net is assumed to be made up of a part of the actors of the overall industrial network. They may or may not adopt formalised structures. Formalised issue-based nets are those created through an explicit contract, and assuming a formal structure and organisation.

Issue-based nets encompass such different forms as trade associations, labour education facilities, farmer cooperatives, trade unions, consortia of firms for joint sourcing or promotion, and regulatory commissions. In general, this type of issue-based net plays an institutionalized role. On the other hand, non-formalised issue-based nets may also come into existence. They are simply virtual nets of relationships without any kind of formal arrangement supporting them. Some informal pressure groups of customers or suppliers developing lobbying activities or struggling for a common goal may fall into this category. They exist since a net of relationships has been set and developed in order to perform a particular collective action or set of collective actions.

Non-formalised or virtual issue-based nets may assume a central role on the dynamics of industrial networks. In fact, virtual issue-based nets are likely to arise out of common and "official" perceptions of an issue (or set of issues) giving rise to a mobilisation of interests beyond institutionally represented groups of interests. In this regard, virtual issue-based nets tend to form as a result of the emergence of interests that may overflow existing institutional arrangements mostly based on formalised associations designed to represent actors' sectional interests. Furthermore, virtual issue-based nets are in most cases short-lived and spur actors to immediate action. Put another way, these virtual and non-formalised nets overlay and interact with the longer lasting nets which support the more formalised collective actors. In other words, non-formalised collective actors – built on the basis of more virtual and less contractual issue-based nets – and formalised collective actors – built on the basis of less virtual and more contractual in nature issue-based nets – are only different ends of the same continuum.

Issue-based nets may not only affect the organisation of individual actors and their strategies. Given that they tend to aggregate a disparate set of actions into a unified and coherent action, they are also likely to influence the processes, the structure of relationships, and therefore the balance of power within industrial networks. This means that cooperation, assuming the form of collective action, may play a key role in shaping the "rules of the game" and the structure of the network. From this point of view, cooperation, complementarity, and coordination must be perceived in the context of groups of actors (i.e. nets), rather than at a mere dyadic level.

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In large and heterogeneous groups, the emergence and development of issue-based nets may be dependent on the role played by an inner core of highly resourceful and interested members which may provide the critical mass necessary for the establishment of the net of relationships. According to Oliver and Marwell and their associates (cf. Oliver *et al.*, 1985; Marwell *et al.*, 1988), such a small subset of interested actors may be sufficient to mobilise time, money and other resources towards the production of a collective benefit despite the fact that the majority of members do little or nothing. In this context, what matters for the emergence of an issue-based net is the type of relationships among the members forming the critical mass, rather than the size of the whole group. The question is not whether it is possible to mobilise all the members of a group towards a collective action. What really matters is the emergence of a net of relationships among a small subset of actors with appropriate interests and resources so that they can act. As a result, relationships within an issue-based net may be differentiated and heterogeneous. On the one hand, a strong web of relationships is likely to be found among the small subset of interested, resourceful and particularly energetic actors leading the collective action process. On the other hand, the bulk of membership may be made up of a mass of passive actors linked by weak ties, and not directly committed to the provision of the collective benefit, though supporting it.

The research project

Having introduced the notion of an issue-based net, this section offers an overview of the research project where such a conceptual construct proved to be particularly powerful in explaining economic dynamics. The way the research project was conducted depended on a number of factors, each comprising several dimensions, which influenced the basic methodological options. The most important determinants were:

(1) the research goals; and
(2) the content and context of the research project.

Research goals

The research project aimed at understanding processes of change in industrial networks induced by collective movements. This broad objective was operationalized through two research questions:

(1) Why and how do collective actions for the promotion and defence of groups of interests emerge in industrial networks?
(2) How do such collective actions influence the dynamics of industrial networks?

Narrowing down the primary objective to a workable size, a number of methodological decisions flowed directly and indirectly from these research questions. First, they have clarified what the study aimed to understand. Following Mintzberg (1979, p. 585), no matter "... what our interest, we have always tried to go into organisations with a well-defined focus – to collect specific kinds of data systematically". The definition of research questions specified not only the kind of data to look for, but also the kind of actors to approach. As Miles and Huberman (1984, p. 34) put it, the research questions make researchers look "... only at some actors in some contexts dealing with some issues". In short, the research questions had important sampling implications. First, data collection focused on a limited number of specific issues which stemmed from the content of the research questions: change in industrial systems, collective action phenomena, and groups of interests. In addition, the research questions had obvious sampling implications since they determined, to some extent, the kind of actors to look at: those who, being involved in collective actions for the promotion or defence of their mutual interests, were likely to collectively affect the process of change in industrial systems.

Furthermore, the methodological decisions were not solely influenced by the content of the research questions. They were also affected by the way such questions were expressed. On the one hand, the two research questions assumed a somewhat broad and unstructured character which called for a methodological approach mainly exploratory in nature. As Strauss and Corbin (1990, p. 19) put it, if the researcher aims to break new ground in a number of aspects, the methodology should be particularly appropriate to understand what lies behind any phenomenon about which little is yet known. On the other hand, the research questions were formulated in terms of "why" and "how" rather than "who", "what" or "where". This clearly demanded a methodological approach

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mainly explanatory rather than descriptive. Quoting Yin (1989, p. 18), "... this is because such questions deal with operational links needing to be traced over time, rather than mere frequency or incidence".

Content and context of the research project

The second major determinant of methodology and research methods had to do with the content and context of the study. The framework for analysis was mainly based on the network approach, a model which resulted from research initially carried out at the University of Uppsala and Stockholm School of Economics, and further developed by other research centres (cf. Mattsson, 1985; Axelsson and Easton, 1992; Hakansson and Snehota, 1995). For a detailed description of the basic features of the network approach, see Ford (1998).

One of the most central features of industrial networks studies is connectedness. And connectedness has significant sampling implications. In fact, methodologies exclusively reliant on statistical inference were, a priori, rejected since they usually require independence amongst sampling units. The point is that this requirement cannot be fulfilled by network studies inasmuch as these assume that sampling units are connected and thus interdependent. This characteristic demands methodological approaches that treat the representativeness of samples not in statistical terms. Moreover, the connectedness character of network studies demands the use of large networks as sampling units. However, this option raises two major difficulties. First, studying a single large network is in most cases impossible or, at least, extremely difficult. Second, it restricts access to a considerable number of methodologies based on the logic of replication – i.e. "the logic of treating a series of cases as a series of experiments with each case serving to confirm or disconfirm the hypotheses" (Eisenhardt, 1989, p. 542). These are the reasons why network studies have usually adopted smaller sampling units such as focal organisations, dyads or small nets.

Taking these considerations into account, the choice of the sampling unit for the study of the dynamics of industrial networks induced by collective actions was the outcome of a trade-off between those two extreme options. On the one hand, the collective character of the research problem did not allow for the use of focal organisations (nor even dyads) as sampling units. On the other hand, adopting the overall network as the sampling unit would probably raise a number of difficulties resulting from the complexity of the work and the impossibility of replication.

The sampling unit adopted was the issue-based net – i.e. a net of relationships amongst actors who are concerned with a particular issue through mutual or conflicting interests. To some extent, it can be regarded as an intermediary option between the extreme alternatives described earlier: large networks vs focal organisations or dyads.

Issue-based nets in the port wine industry

The criteria used for selecting the industrial context were subordinated to two basic requirements. First, the choice of the industry was largely driven by the research questions. Second, for practical purposes, the industry should not offer significant problems of access and/or confidentiality which jeopardized the viability of the whole project.

The industrial context was provided by the port wine production and trade system. This was selected because it respected, in general, those two requirements. First of all, this industry is characterised by a number of aspects particularly interesting for the study of change in industrial networks induced by mobilisation of interests. The industry is embedded in a mature and well differentiated social structure where power asymmetries play a crucial role in shaping not only individual perceptions and actions, but also the pattern of exchange relationships as well as the overall network structure. The most relevant imbalance stems from the division between the two major interest groups. The first includes tens of thousands of farmers located in the Douro valley in North-eastern Portugal whose main activity is the production of port wine. The second major group is made up of a few dozen shipping-houses mainly dedicated to port trading. They are located some 100km west of the valley in an urban region near the mouth of the river Douro. Socially, the split is between a rural, provincial and relatively isolated social structure, and a more cosmopolitan, wealthier and better educated élite. In this context, technological changes are relatively unimportant when compared with other forms of change

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such as the ones caused by disputes and aggregation of interests.

Moreover, the dynamics of the port wine industrial network is not solely influenced by power asymmetries stemming from social imbalances. Its evolution is also driven by political considerations. These are very much the product of a strong state intervention which has for a long time constrained both port production and trade with a severe protective legislation. In fact, since the beginning of the state intervention in the mid-1700s, the relations between the legislative and regulatory powers on the one hand, and the network actors on the other, have played a key role in shaping the fortunes of the whole business system.

These two features reflect a basic characteristic of this industry: the non-existence of clear cut boundaries between economic and non-economic exchange relationships. Non-economic exchange relationships – e.g. social and political in nature – overlap, encircle and surround economic exchange relationships. In these circumstances, the port wine industry encompasses a significant number of issue-based nets which aggregate actors sharing mutual interests – not only economic but also social and political interests. These issue-based nets are in most cases the product of attempts by different types of actors to influence the structure and evolution of the overall network in ways that protect and enhance their specific interests. In other words, such nets are means of inducing change or preserving stability.

In sum, the port wine industry offers a wide field of research encompassing a significant number of phenomena related to the emergence, development and influence of collective actions in industrial networks. In other words, this industry provides a good industrial context whose study and analysis are likely to shed light on the issues raised by the research questions.

The study followed a typical case-oriented approach. According to Easton (1995), this involves the analysis of a small number of situations about which data are collected using multiple sources in order to develop a holistic description as the end result. The rationale for this methodological option has to do with the exploratory and explanatory character of the study. As mentioned earlier, little was known about the kind of phenomena being studied. The industrial networks theory had so far focused mainly on processes of change induced by economic or technological factors, to the neglect of processes of change involving mobilisation and disputes of interests amongst groups of actors. In this context, the case-oriented approach was used because of its exploratory nature inasmuch as it stimulates the development of new substantive theories because it focuses on understanding the dynamics present within single settings (Ragin, 1987, p. 44). The second reason for the choice of such an approach stemmed from its explanatory character. As stressed before, the research questions were formulated in terms of "why" and "how" rather than "who", "what" or "where". And, as Yin (1989) points out, case studies are more appropriate to research questions formulated in terms of "why" and "how" because such questions raise issues linked with relational forms which need to be understood over time, rather than mere frequency or incidence.

In terms of sample size, case studies usually involve a small number of units. It may be a sample of one, although in most studies the sample includes multiple cases (cf. Pettigrew, 1988; Easton *et al.*, 1993). The study addressed in this paper was a multiple case research. The justification for this option had not to do with the need to increase statistical representativeness. On the contrary, the study of several cases aimed to improve the capacity to generate theory since it permitted both replication and extension amongst individual cases. Following Eisenhardt (1991, p. 620), replication means that the cases were "... used for independent corroboration of specific propositions. This corroboration helped (...) to perceive patterns more easily and to eliminate chance associations". According to the same author, extension means that the cases were used "... to develop more elaborate theory. Different cases emphasised complementary aspects of the phenomenon [under study]. By piecing together the individual patterns, [one can] (...) draw a more complete theoretical picture" (Eisenhardt, 1991, p. 620).

The research project involved the study of three cases, each of which corresponded to an issue-based net. The choice of the cases was subordinated to the achievement of two objectives. First, to capture the richest data in terms of connectedness, sociality and dynamism of the port wine network. Second, to get the broadest information in terms of scope of the network. Within this frame, the cases studied were:

- *The case of shipments in bulk*. This case had to do with a collective movement

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undertaken by a number of actors involved in the port trade which aimed at putting an end to bulk sales of port. The issue was mainly related to the relationships between/among actors involved in the trade and distribution of port.

- *The case of excess stocks.* The second case mainly addressed the relationships between/among actors involved in the production and trade of port. The issue was related to excess stocks accumulated in the late 1980s, and their negative impact on the strategic position of some groups of actors within the overall port network.
- *The case of the institutional arrangement.* Finally, the third case had a broader character. Since the issue was related to the reformulation of the institutional arrangement of the port wine industry, the case involved a particularly large number of different types of actors – e.g. individuals, firms, trade associations, consortia of firms, informal groups of interests and governmental organisations.

But how have these cases been analysed? And how have data about these cases been collected? Answering these questions is the purpose of the next sections.

Data collection

The study was conducted on the basis of multiple sources of evidence. This option was mainly determined by the case-oriented approach adopted. In fact, as mentioned earlier, case research demands an in-depth and comprehensive study of a small number of situations. This calls for the collection of multiple kinds of data since, as Eisenhardt (1989, p. 538) sustains, "... multiple data collection methods provide stronger substantiation of constructs and hypothesis".

The analysis of the three cases was mainly based on primary data collected through personal interviews where informants were induced to talk about their perceptions of the issues being studied. The reasons for the concentration on individual perceptions were twofold. The first reason flowed directly from the research questions. As stated before, such questions were mainly exploratory and explanatory in nature. They were exploratory mostly because of the lack of knowledge about the kind of phenomena under study: change in industrial networks induced by mobilisation of interests. Research questions were explanatory because, given that they were formulated in terms of "why" and "how", they reflected the declared purpose of explaining the importance of collective action phenomena for the understanding of change in industrial networks rather than looking for mere descriptions of facts. Within this context, perceptual data were useful for both understanding the rationale underlying such phenomena and suggesting directly theoretical constructs which could be strengthened by replication and extension. Mintzberg (1979, p. 587) describes this process in the following way: "For while systematic data create the foundation for our theories, it is the anecdotal data that enable us to do the building. Theory building seems to require rich description, the richness that comes from anecdote. We uncover all kinds of relationships in our hard data, but it is only through the use of these soft data that we are able to explain them".

The second reason for the concentration on individual perceptions had to do with the partly constructivist position assumed in the research project. According to this perspective, social reality is the product of both individual and social construction which results from the interaction amongst individual actors. This means that the major object of concern was the way actors perceived and interpreted their individual and collective experiences within the systems – e.g. economic, social and political – to which they belonged. Accordingly, instead of treating accounts as objective descriptions, individual perceptions were considered as ways through which respondents structured the systems they were in.

To complement primary data, secondary data were also collected. The justification for their use was also twofold. First, they stemmed from the case-research approach adopted, inasmuch as secondary data provided additional sources of evidence which, allowing for triangulation, were on the basis of a stronger substantiation of new theoretical insights resulting from the analysis of the three cases. Second, secondary data proved to be especially relevant to the comprehensive understanding of the industrial context.

Three broad categories of secondary data were used:

(1) published data;
(2) internal documentation; and
(3) information provided by industry experts.

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Published data comprised, essentially, information supplied by books, articles and published interviews. The port wine industry is probably one of the most exhaustively analysed industries. Apart from literature on technical issues (e.g. concerning viticulture and vinification processes) there are dozens of books ranging from general descriptions of the industry to specific fields such as economics, sociology and politics. Data provided by books were especially useful for the general characterisation of the industry, since the specific nature of the three issues studied was not in general analysed by such literature. However, these issues were the subject matter of many articles and interviews published by the media. Both Portuguese media (such as the newspapers *Público*, *Jornal de Notícias* and *Expresso*), and magazines in English and French (e.g. *Wine and Spirit*, *Decanter* and *Revue Vinicole*) provided a significant number of pieces about some of the most relevant issues faced by the industry. Secondary data also encompassed internal documentation, most of it produced by the Port Wine Institute. The bulk of this documentation was made up of statistical data on the evolution of sales and prices. Use was also made of a number of studies carried out by consultants and staff members of the Institute. In addition, industry experts have provided useful insights. Apart from information experts supplied through media, data were also collected via personal interviews. Six experts in different fields – such as economics, sociology, politics, law and history – were interviewed.

Sampling

When it comes to sampling decisions, the basic criterion to take into account in quantitative research is the statistical representativeness of the sample – i.e. the degree to which it resembles the whole population in what concerns the characteristics being studied since it should enable researchers to generalise their findings for the entire population.

In this research project, these kinds of considerations were also taken into account, albeit in a different way, since issue-based nets were used as sampling units. The basic concern in terms of sampling was the representativeness of concepts rather than the statistical representativeness. In order to achieve such a requirement, what Strauss and Corbin (1990) refer to as "theoretical sampling" was adopted. This means that the sample included only as many respondents as was needed to "saturate" the categories being studied. According to this principle, respondents were included in the sample inasmuch as the information they were likely to provide was theoretically relevant. According to the authors, "... theoretical relevance indicates that certain concepts are deemed significant because:

(1) they are repeatedly present or notably absent when comparing incident after incident; and
(2) through the coding procedures they earn the status of categories" (Strauss and Corbin, 1990, p. 177).

It is important to notice the use of the term "incident" rather than "person". As a matter of fact, the primary objective of the study was not to collect people so that a conceptually representative sample could be produced. On the contrary, the interest was in getting information about:

(1) what people did (or did not) in terms of collective actions;
(2) the conditions which led to the emergence (or absence) of such collective phenomena;
(3) how such phenomena evolved over time within and across collective forms of organisation as well as other forms of organisation;
(4) the consequences and impact of collective actions on the dynamics of industrial networks.

In short, the basic interest of the study was in sample incidents rather than in people *per se*.

Given the basic research method adopted (multiple-case research), the sampling process was carried out at two levels: case and respondent. At the first level, the sample included three units, each of which corresponded to a virtual issue-based net. As mentioned earlier, the cases were not chosen randomly inasmuch as random selection was neither necessary nor desirable. On the contrary, the criteria used for selecting the three cases had much to do with the expressed purpose of both replicating situations and extending emergent theory. At the second level, the sampling process involved the selection of the interviewees for each case. Such a selection was based on a snow-balling process from an initial actor – i.e. the researcher attempted to follow connections between actors as if he was following a route made up of bridges linking interdependent islands. The rationale for this method

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stemmed from the connectedness of industrial networks which demanded that research should be carried out on nets of actors linked by exchange relationships.

The sampling process did not follow a rigid pre-established sampling plan which should be respected in all circumstances. By contrast, it was developed while retaining some degree of flexibility. In other words, sampling was a dynamic process which evolved on the basis of the evolving theoretical relevance of concepts. This reflects two key features of the sampling process adopted. First, sampling and data analysis were overlapping and interwoven tasks with mutual impacts. Second, it also reflects the objective of avoiding what is considered one of the most undesirable pitfalls faced by many researchers: the indiscriminate collection of data, and the consequent accumulation of far more information than there will be time to study.

Taking these considerations into account, the process developed in the following way. First, sampling was a priori opened to those incidents that were likely to provide the most relevant data about the phenomenon being studied. Second, as new categories were discovered and relationships among them were established, sampling became more focused on some incidents in order to uncover or validate such discoveries. Third, some "peripheral" informants – i.e. people who apparently were not closely linked with the issues under study but whose perceptions about such issues were likely to contribute to new and insightful perspectives – were also deliberately included. In this regard, the experts interviewed were typical "peripheral" informants. Finally, sampling stopped when "theoretical saturation" was reached. This means that sampling came to an end when:

(1) ... no new or relevant data seemed to emerge regarding a category;
(2) the category development was dense, insofar as all of the paradigm elements were accounted for, along with variation and process;
(3) the relationships between categories were well established and validated (Strauss and Corbin, 1990, p. 188).

A total of 56 interviews were carried out. The sample included 12 farmers (one was also director of a wine cooperative), three farmers and bottlers (two were also board members of their respective association), two directors of wine cooperatives, 21 directors of shipping-houses (one was also the chairman of a consortium of shippers), and six board members of associations related to the port wine business. Six experts were also interviewed as well as the chairman of the Port Wine Institute, the chairman of the Comissão de Coordenação da Região do Norte (a governmental organisation for the development of the Northern region of Portugal), and two board members of interprofessional bodies of other Portuguese wine regions.

The interviews were conducted in accordance with a semi-structured schedule. The option for semi-structured interviews was the result of a trade-off between two requirements: the need for flexibility and the importance of structured data. The first requirement had to do with the exploratory character of the study. Since it was important to allow the informants to feel free to develop topics and make points on issues not previously contemplated in the schedule, the interviewing process should not be fully directive. If directed by a rigidly structured guide, respondents would be less likely to handle the interview in the way most appropriate for their reasoning. This would mean that most of the potential richness of their accounts might be not retrieved. On the other hand, it was important that interviews followed a pre-established schedule: first, to ensure that all the foreseen issues around the research questions could be discussed; second, to ensure interviewees felt relaxed enough to respond in a systematic rather than inconsistent way; and finally, to enable further comparisons among interviews.

The semi-structured schedule of the interviews included two main sections. The first aimed at understanding the key issues the interviewee (or his/her organisation) was facing as well as the general background to his or her perceptions, beliefs and actions (or absence of actions). The second section had two objectives, each of which corresponding to the two research questions. First, it aimed at discovering whether collective actions (for the promotion or defence of groups of interests) had emerged to cope with the issue(s) previously identified. In addition, this section also aimed at understanding how such actions influenced the dynamics of the industrial network or part of it.

In general, interviews were conducted at the respondents' place of work (if they were members of firms or other organisations) or at home (if the informants were farmers). And quite often, *noblesse oblige*, conversation was

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"lubricated" by a glass of port. All interviews were tape-recorded and lasted from one to two and a half hours. However, most interviews were preceded (or followed) by long periods of conversation, namely during lunch time as usual in Portugal. Although these conversations were not recorded, they proved to be very useful because their informal character not only led informants to get relaxed but also provided additional data. These data along with other information not retrieved through the semi-structured interviews were later transcribed to a contact summary sheet. These notes and memos were also used as an additional source of data.

Data analysis

Just a brief word about the data analysis process. It was largely determined by the use of issue-based nets as sampling units which was closely linked to the case-oriented approach adopted. Following Eisenhardt (1989), this comprised two basic stages: a within-case analysis and a cross-case analysis. The former was developed separately for each issue-based net and entailed two levels of understanding. The first, mainly descriptive in nature, aimed at getting a clear picture of the phenomena under study. The second was mainly exploratory and explanatory in nature.

An important characteristic of this research project is that it was based on words rather than numbers. The idiosyncrasy of words stems from the fact that they tend to be more ambiguous than numbers; first, because the same word may assume different meanings. For instance, "trust" (a word often used during the interviews) meant different things depending on the informant. Second, the significance of words was frequently dependent on the context – i.e. it became necessary to look backward and forward to other expressions. Finally, sometimes words (or even sets of words) did not express the whole meaning that respondents wanted to convey. For example, the same word followed by a smile was likely to assume a different meaning if followed by a shrug of the shoulders. A common solution for the interpretation of qualitative pieces of information is that of coding. A code is a category applied to a word or set of words – most often a sentence or a paragraph – in order to interpret data documents so that new theoretical insights can be generated from them.

Following Richards and Richards (1990), the process of within-case analysis involved the following steps: collecting together all the transcripts analysed; coding the documents under several categories; using codes as a basis for searching topics in segments of text; making notes and memos about emerging ideas and theories as the process evolved; extending and re-shaping the coding system as understanding and theorising grew; and, finally, returning to step 2 and developing the whole process in an interactive way (if and when necessary). Coupled with within-case analysis, cross-case analysis looked beyond initial impressions and was directed towards the search for common patterns among the cases studied. It involved three basic steps (cf. Ragin, 1987):

(1) searching for similarities amongst the three cases analysed;
(2) evaluating whether such similarities were causally relevant to the phenomenon under study; and
(3) formulating general explanations on the basis of the similarities found.

In this context coding and interpretation of data were overlapping processes which consisted of two simultaneous activities:

(1) conceptual operations; and
(2) mechanical tasks.

The former were determined by the methodological approach described before. Mechanical tasks, in turn, involved a number of manipulative activities such as locating words (or sets of words) in the documents, marking relevant segments of text, adding comments to these segments, and extracting and assembling conceptually related segments. These operations were carried out with the help of a computing software for qualitative analysis. The software used was NUDIST, a system created by Richards and Richards (1990), which stands for "Non-numerical Unstructured Data Indexing, Searching and Theorising".

The use of computers in qualitative analysis has proceeded apace over the last few years. Tesch (1990) provided a broad review of first generation packages, followed by a very useful collection of papers edited by Fielding and Lee (1991). More recently, a number of authors have developed serious methodological and practical reflections on the use of computer software in qualitative analysis. Dey (1993) provides a thorough analysis of all the stages involved in qualitative

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data analysis and how and where computer software can help this process. Weaver and Atkinson (1994) offer a insightful comparison of different software packages and commentary on their adequacy to perform a number of qualitative analysis tasks. Weitzman and Miles (1995) provide thorough descriptions of a broad range of software packages as well as an evaluation of their capabilities and limitations. Kelle (1995) offers an excellent compilation of chapters focusing on the methodological and practical issues facing qualitative researchers who use computer software in their analysis. For more comprehensive descriptions of how the software may be used in practice see Rodgers (1995) and Lewins (1995).

The choice of a software package to help the qualitative data analysis phase of this project was determined by a number of factors. First, the huge amount of information demanded a powerful tool to code and retrieve large chunks of text. Most software packages provide this basic feature, but not all packages can handle large document databases or complex code labelling. Second, it was important to use a software package that supported as closely as possible some of the procedures specified by grounded theory (Glaser and Strauss, 1967; Corbin and Strauss, 1990; Strauss and Corbin, 1994). One of the key characteristics of grounded theory is its inductive character. The analysis moves from first level categorisation of respondents' answers in their own language, to second level categorisation using the researcher's theoretical categories and language. This move makes a number of demands on analysis software (Araújo, 1995). The analysis software must be able to support the progressive development of categories that, although founded in the language of respondents, will move closer and closer to the theoretical language of the researcher. As part of this process, the software must ideally support the interplay between the indexing system that categorises the data and the document database. Lastly, the software must be able to allow the researcher to reconstruct the paths taken in the process of categorising data, retrieving categories with segments of text attached and change the categories as a result of successive retrieval operations. In other words, the software must be able to leave an audit trail to the processes the researcher went through to arrive at a final categorisation of the data.

In sum, the computing software was not used as a mere tool to code and retrieve segments of text. Rather, it was used to assist the researcher in shaping his reasoning about data, and in forming and testing the theoretical hypotheses. In other words, it was used as a tool especially designed for researchers who follow a grounded theory approach. However, this does not mean that the tasks of thinking, deciding, judging and interpreting were done by the software. Computers do not perform conceptual decisions. They just help researchers.

Conclusion

The approach addressed in this paper represents a development of the case study method which involves an in-depth analysis of a small number of situations or cases. In this line, an issue-based net can be regarded as a situation or a case. The importance of this concept stems from the fact that issue-based nets represent an intermediary option between two extreme alternatives: the use of focal organisations (or relationships) as sampling units versus the adoption of the overall network as unit of analysis. Taking into consideration the difficulties associated with the second option, the use of issue-based nets as sampling units can be regarded as a practical solution for capturing the connectedness character of network analyses. In 1995 Easton stated that since industrial networks studies have usually adopted the relationship as the unit of analysis, they cannot claim to be true network studies. Our belief is that the use of issue-based nets tends to reinforce the connectedness character of many network studies which, in turn, is likely to increase their potential for offering more holistic perspectives.

In this line, the notion of an issue-based net may contribute to an expansion of knowledge not only within the scope of the networks studies but also in other fields of qualitative research. The richness of this methodological approach has to do with its systemic and dynamic character. In fact, studying an issue-based net involves both the development of a systemic view of the whole set of situations involved with a particular collective issue, and the understanding of the dynamics of industrial systems driven by the mobilisation of collective interests.

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