

Context Sensitive Decision Analysis Based on the Investigation of Organisational Information Networks

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Abstract

This paper reports on our application of network analysis to a large organisation undergoing drastic changes. To develop new techniques that enable DSS researchers and developers to analyse the context of the organisations where they must contribute to decision making, we investigated the political, organisational and environmental factors that shape the decision making processes of a case study organisation. We also analysed the relationship between the IS department and the other functional areas in order to analyse the contribution of IS staff to the decision making of this organisation. Our results indicate that the approach used in this research - network analysis - provides a valuable analytical framework in trying to capture the reality of decision making in an organisation and has the potential to provide the basis for a novel method for developing DSS applications. They also confirm that awareness of the context of decision making is paramount for the development of DSSs that make a worthy contribution to the management of an organisation. Finally, they indicate that the contribution of IS to the decision making of an organisation is related to the quality of relations between IS staff and staff in other departments.

Keywords

Organisation Decision Making, Context, Network Analysis, DSS

1 INTRODUCTION

The DSS area has continued to attract the attention of both IS researchers and software vendors over the past 25 years. Under a variety of names and acronyms (such as DSS, EIS or ESS), systems that are designed to support the decision making of managers have been put forward as critical to the efficiency of modern organisations (Galliers, 1987; Teng and Galetta, 1991; Ferioli and Migliarese, 1996). However, senior managers have, so far, proved less enthusiastic about the contribution of decision support systems. Their main criticism is that technical solutions are being imposed on them without an adequate analysis of their information and decision needs. Thus, applications of IT in modern organisations have failed to achieve the levels promised by the ever ambitious IS literature (Ciborra, 1993).

Computer systems are perceived as being simply unable to improve managers' information processing and, overall, as unable to improve the decision making of organisations. Thus, many researchers have regretted that a wide gap still exists between the claimed high potential of DSS and its still limited use in organisations (Alter, 1992; Ferioli and Migliarese, 1996). For example, Murphy (1994) has regretted the overly technical orientation evident in much of the research on DSS, noting that

'the difference between successful and unsuccessful decision support is most likely to be influenced by the actions of the staff rather than any technological platform' (Murphy, 1994: p.106).

Murphy suggested that better DSS applications could be developed if more consideration was given to the mechanisms for interaction between managers and developers of DSSs. In addition, Murphy (1995) argued that the actions DSS developers take when attempting to help managers' decision making are critical to these managers' perception of the contribution of DSS to decision making and, therefore, condition the future involvement of DSS staff in decision making.

Levine and Pomerol (1995) have noted the high levels of abstraction required by the representation and conceptualisation of many organisational decisions. They have concluded that the difficulty in specifying decision problems in tangible terms at the early stages of a decision making process makes the analysis of DSS requirements impossible with current methods.

In this paper, we argue that this gap in our understanding of the dynamics of DSS development must be addressed by the development of suitable analysis techniques that allow the capture of the hidden dimensions of organisational decision making. In particular, the political context of decision making processes must be more finely understood by DSS developers before they propose systems that may modify the information and communication webs of their organisations. This must include an analysis of the relationship between the IS department and the other 'client' functional areas. We present the results of our experimentation with network analysis in the study of a large organisation and show how this novel

approach allows researchers to capture much of the context of organisational decision making. The new approach which emerged from our application of network analysis to DSS research will support more complex analysis of the decision problems facing organisations which must be tackled by DSS personnel. In particular, it will allow researchers and developers to take into account the multi-manager nature of most important decision making processes in organisations.

2 ANALYSING ORGANISATIONAL DECISION MAKING CONTEXT

Organisational decision making requires a specific type of inquiry. Crozier (1964) has likened the interactions taking place in organisations to an array of overlapping games of decision, power and more or less open exchanges of information (*'un ensemble de jeux'*). Hickson *et al.* (1985) have given support to this metaphor. They specified that these games are not played to destruction and must respect a set of organisational rules as the unity of the organisation must be preserved, but that they may often strain relationships between actors. The stakes of these games are the establishment of the players in the game and in future games rather than an all-or-nothing outcome. Thus, organisations will survive another game, another decision process (Crozier, 1976). Other observations by Crozier and Friedberg (1977) have also shown how certain categories of actors in large organisations use their expertise to create uncertainty for the managers who supervise them in order to gain a position of virtual dominance over them. They have studied the case of a large railroad company where the mechanics in charge of maintaining and repairing the engines managed to impose their own agenda to their supervisors by 'playing' with the down time of the equipment. This kind of rivalry between established groups results in managers having to gather information through alternative channels in order to find out what staff in the opposite coalition are doing. This is aimed at reducing the uncertainty created by their rivals and restoring the balance of power between both sides of the conflict. But these managers' data collection is obviously made more difficult by the fact that their rivals are purposefully withholding the required information about their activity and, often, use propaganda-like communication to distort other managers' perception of reality (Brunsson, 1989).

Hickson *et al.* (1985) concluded that there was a danger in studying organisational decision making as if it were the same in every setting and situation because,

'surely, the game is played differently in different organisations or with different decision topics' (p. 116).

Hickson *et al.* (1985) concluded that a unique model of decision making is unlikely to cater for all decision topics and all organisational situations.

Similarly, Bannon (1997) has claimed that the Group Decision Support Systems (GDSS) movement has worked on narrow assumptions and has adopted an

overly rationalist perspective. Many political aspects of decision making processes in groups have therefore been completely ignored by reduction of the aspects of the decision process to be supported to the decision 'moment' when the group seeks to reach a final decision.

By contrast, researchers who have attempted to analyse the behaviour of whole organisations have pointed out that it is required to be able to break down organisational action into tasks carried out by individuals (Ba *et al.*, 1995; Landy, 1997). Ba *et al.* (1995) have concluded that:

'We still need a better understanding of how to decompose an organisational environment into semi-independent components in a manner which really reflects how different parts of the organisation work together to accomplish common goals' (p. 319).

Ciborra (1985) highlighted the difficulties involved in such endeavours. He explained that the traditional models of organisational decision making used in many disciplines ignore the fact that

'organisations are mixtures of co-operations and conflicts between participants [and] the model assumes that all the participants share common goals' (p. 59).

Studies of organisational processes may therefore not be able to account for many of the irregularities that often appear in decision making processes if they do not focus on the actions of individuals and the roles they play in the decision making process.

We argue that the implications of much of this research for DSS analysis and DSS development has not been fully exploited in the DSS area. It seems that the analytical tools required in order to carry out the contextual analysis of organisations necessary for the development of DSS applications that truly contribute to the management of organisations are not available. More specifically, we argue that a detailed analysis of the information web of the organisations where DSS applications are being developed and implemented is required as a primer for an effective and efficient organisational use of DSS. Understanding how these information webs are shaped and re-shaped by the decision making processes of an organisation constitutes an essential step in the analysis of how to support the decision making of managers in the context of a given organisation.

3 ORGANISATIONAL NETWORK ANALYSIS – A NOVEL METHODOLOGY FOR DSS RESEARCH

In this research, we used network analysis to capture and understand the organisational context and decision making processes at the different levels of analysis required for a full understanding of these complex phenomena. In particular, we tried to bridge the gap between the 'micro' and 'macro' orders of analysis: the level of dyadic, triadic and other small groups of managers and the organisational or even societal level (Galaskiewicz and Wasseman, 1994) as described in Figure 1.

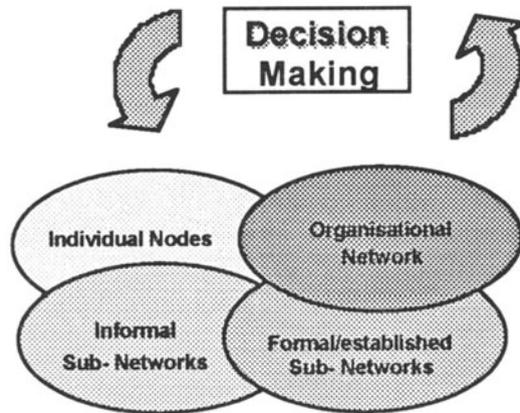


Figure 1 Levels of analysis in the study of organisations' decision making

To date, experimentation with the application of network analysis to the investigation of decision situations faced by managers has yielded interesting results and confirmed the usefulness of the concept in enabling the identification of the information and communication flows amongst decisional groups and in providing DSS developers with richer insights into the processes they are trying to support (Ferioli and Migliarese, 1996). These studies reveal that the analysis of the mechanisms whereby organisations reach policy decisions result from numerous events taking place at a variety of levels, from the individual level to the level of the organisation (Adam, 1996).

Network analysis views actors as participants in complex social systems involving many other actors whose behaviour and actions may affect an individual's behaviour (Knoke and Kuklinski, 1982). Furthermore, network analysis focuses on identifying the properties of networks in which actors are embedded and detects the effects on individuals and groups behaviour. Thus, networks, made up of actors, or nodes, and their relationships can be used to represent organisations and theorise about them. As noted by Blau (1989),

'When people are thrown together, and before common goals or role expectations have crystallised amongst them, the advantages to be gained from entering into exchanges relations furnish incentives for social interaction, thus fostering the development of a network of social relations and a rudimentary group structure'. (p. 92)

The network metaphor was also applied to the study of managers by Kotter (1984) who suggested that 'network building' was a major activity of top managers who, especially when joining a new company, spend considerable energy in 'developing a network of co-operative relationships among those people they feel are needed to satisfy their emerging agendas'. (p.161)

Mintzberg (1973) also described top managers as being hubs - or information processors - in the overall organisational network of actors.

According to Ferlie and Pettigrew (1996), network based styles of management are becoming more and more important and their research has revealed the perception amongst managers that networking with external stakeholders is now a key managerial skill; although little is known about how managers should go about creating such linkages or how organisations should encourage such initiatives. Network analysis may be the key to our understanding of the internal and external fabric of relationships that exist in and around organisations; an understanding that is required for the development of better DSS applications.

One specificity of network analysis stems from its surgical accuracy in setting a clear focus on the object of the study. As described by Burt (1980), researchers can decide to concentrate on a number of different networks that exist in organisations. For example, Burt (1976) has distinguished economic relations, friendship relations, kinship relations, status relations and political relations, while Knoke and Kuklinski (1982) mention supervising, helping or gossiping, making essentially reference to the *content* of the relations studied. The choice of which networks to focus upon is obviously of paramount importance for the results of the study. Thus, researchers must plan for their research designs carefully and decide which networks or sub-networks are going to become the focus of their studies in view of the specific goals they are pursuing. For example, previous research investigating decision making processes and decisional sub-networks in organisations focused on information and communication exchanges and this proved particularly successful in yielding more complete pictures of how managerial teams make sense of their environment, identify problems and implement the solution they design (Adam, 1996). Evidently, focusing on other types of relationships may open different directions of research in this area and the success of a study may be regarded by researchers as an indication of the suitability of the research foci selected.

Thus, the network approach to organisations can constitute a useful analytical basis to guide the actions of DSS developers and enable a more insightful study of the contexts in which DSS systems are being implemented. The experimentation carried out to date has confirmed the richness of analysis of organisational decision making which it enables. In particular, the analysis of the positions managers occupy in organisational networks can provide new explanations for patterns of behaviour that have remained unexplained by research so far and can help to explain the failure of many DSSs. For instance, DSS research has rarely considered the organisation-wide dimension of decision making processes and the potential importance of discontinuities in an organisation's information network.

Overall, the network approach to organisations suggests a radically new focus on the qualitative aspects of the relationships existing between executives at the level of the whole organisation as opposed to the more traditional emphasis on the characteristics of a specific decision situation tackled by a single manager or a small group of managers.

We applied network analysis to the study of decision making in a large organisation undergoing drastic change following major modifications in its environment. Based on a number of interviews with top managers, we identified the overall network of actors influencing and shaping the decision making of this organisation and through the study of a number of specific instances of decisions, we attempted to refine our picture of the decision making process in this organisation and relate these processes to the organisational context.

4 ORGANISATIONAL NETWORK ANALYSIS – A CASE STUDY

4.1 The Case Study Organisation: Facing a Changing External Context

In this case study, we analysed the internal mechanisms and external relationships that shape the decision making processes and the organisational network in a large utility organisation which is referred to as ABC hereafter. We also investigated the nature of the relationship between the IT department and its 'client' departments in order to establish whether there were any stumbling blocks to an increase of the role of IT in this organisation. This was perceived as particularly vital at this time in ABC because the radical strategic changes with which the company was faced required the support of information systems in order to be successful. These radical changes had fundamental implications for the context of decision making at ABC and we attempted to identify in what ways the new context would be different and the changes in the information network of the organisation that would result.

ABC is an organisation which provides natural gas services in Ireland for domestic, industrial and commercial purposes. Its mission includes the development of the infrastructure of pipe-lines required for an efficient delivery of gas to the largest number of customers and the administration of the commercial activities involved in selling gas. The company's turnover for 1996 reached IR£271m up 14% in comparison with 1995 and the profit before tax reached IR£82m up 22% from the previous year. These figures draw the picture of a healthy organisation and reflect an increase in the volumes sold of 13% (most of which comes from a 20% increase in residential sales). This increase has been sustained over the last five years during which residential sales have increased by 88%. This is the result of the expansion of the network of pipe-lines to approximately 285,000 homes. As stated by the Chairman of the Board of ABC,

'These figures tell a story of a vibrant energy company, competing with alternative fuels in an increasingly competitive market and creating a growing demand for its product'. (ABC Annual Report, 1996).

Such enthusiasm is clearly justified by the prospect of further development in the Irish gas network, but must also be viewed in the light of the coming opening of the Irish gas market to other European operators which will open the door to 'gas-

to-gas' competition; a move which is radically changing the context of decision making at ABC.

As perceived by its top management, ABC now faces the prospect of major changes in its environment and, in particular, in the nature of the up to now fairly captive national market. The situation with which management has had to deal involved ABC being mainly a utility company responsible for developing an infrastructure of pipe-lines in Ireland and distributing the gas supplied by a single supplier. In the words of one top manager at ABC, this monopolistic situation had meant that 'ABC was essentially an engineering company' where managers perceive that the main purpose of the company is to extend and maintain the gas distribution architecture of the country as opposed to any other, more customer-oriented activity. As noted by Johnson and Scholes (1997), such situations are not uncommon in the public sector where companies are more controlled by political considerations than by market conditions and tend to focus on competing for government resources or demonstrating technological competence.

ABC's monopoly position is set to cease, slowly but surely, following the application by the Irish government of the European Union Directive dealing with Third Party Access (TPA) in Europe. The Energy Act (1995) states that certain categories of customers will be able to buy their gas abroad and import it through the ABC's Interconnector. ABC is faced with a situation where its major corporate customers (representing 30% of turnover) can purchase their supplies abroad. Other suppliers will be able to sell their gas to any customer in Ireland by paying a transportation fee in order to purchase capacity on the ABC infrastructure. The situation of ABC is actually not unique and shared by many semi-state agencies in other European countries from gas trading to telecommunications. In the words of one executive at ABC, the company must now 'switch from a technology-oriented focus to a customer-oriented focus'. To deal with its changing competitive environment, ABC has to develop a separate branch of activity to serve customers who only want to buy capacity but not gas from ABC. The possibility for a small number of large customers to look for cheaper alternatives means that a very competitive position must be put in place, especially in terms of price. Thus, the old fashioned price setting mechanism based on the price of oil minus a small percentage no longer applies and a number of well-established networks linking actors within and without ABC will be altered drastically in order to cope with the introduction of competition; in particular, the network linking ABC to its clients.

In this new context where customers not only have to be persuaded to switch to natural gas, but also to buy it from ABC, top management now recognises that the only guarantee for continuous success lies in their ability to become more competitive and more customer-oriented. This requires the elaboration and the implementation of a new strategy for the organisation which has major implications for most of the functional areas at ABC. One of the areas which will have to re-think radically its role within the overall structure is the Information Systems department which must plan pro-actively for the systems and services that

will be required to deal successfully with the 'new' ABC Ireland and provide a proper interface with ABC's customers. In the words of the Chairman of the Board, the specific aim of the latest changes in the IT area (including the appointment of a new Chief Information Officer) were to 'make IT work ' and to 'make it fit in the business strategy and not the contrary for a change!'

4.2 Overall Decision Making at ABC– A Preview on the Internal Context at ABC

In the current context, the main managerial mechanism at ABC revolves around the management committee (Figure 2) which meets three times a month for at least half a day (plus some special ad-hoc meetings). This committee is chaired by the Chief Executive Officer (CEO) and it is customary that all top managers would attend each meeting even though deputies might be called in to report on special issues where technical or other types of expertise is required.

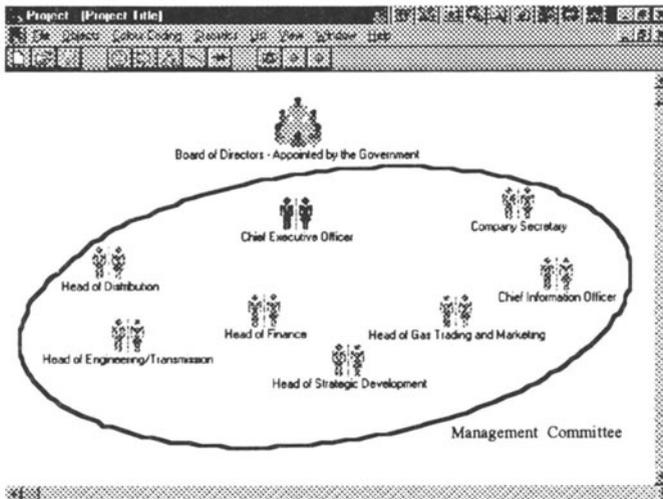


Figure 2 Formal managerial structure at ABC

Typically, heads of functions prepare reports on their respective areas and present them in session to the entire group. Questions are asked and answered on the spot or noted in the minutes to be addressed in a following meeting once information has been prepared. The minutes appear to be the central document guiding the tactical efforts of the firm and, to reflect this importance, they are prepared with great care and are sorted out under a number of headings such as: 'Action point', 'Report', 'Opinions', etc. The set of minutes arising from one meeting is used to structure the next for which an agenda is prepared and circulated

in advance. The organisational effort is thus steered in certain directions and the attention of top managers is focused on the items listed for the next meeting.

Once a month, a special review meeting is held to monitor the performance of the various areas during the period elapsed. Each head of function must explain the performance of his or her area based on monthly accounting statements (balance sheet and profit and loss account) set against the budget for this period and the same period of the previous year. Variances are noted and explanations are proposed to account for them. These financial data are provided by the Finance and Marketing functions based on reports produced by their information systems.

Other statistics are produced by a tightly knit web of computer applications which synthesise the activity of the firm in a number of areas. These include some closely monitored statistics including: sales reports per division, evolution of the number of customers, weather analysis report in comparison with budget¹, analysis of customer service (number of complaints registered) and safety intervention data - number of calls answered within 60 minutes of logging and explanation as to why some calls were not answered in time².

As meetings are constrained by time, individual managers are often required to study these reports in detail so that they can keep the management committee abreast of the latest progress. Typically, only exceptions come under the scrutiny of the CEO during these meetings.

As noted by the Finance Director, the functional areas of ABC are relatively independent and they operate from different budgets for which they are accountable. They have control of the costs in their areas and are responsible for the monitoring of their variances. Some interdependencies do exist, though, as overall sales are dependent upon the public perception of gas as a resource, which is typically tackled through corporate advertising (which has developed significantly over recent years, promoting gas as a user-friendly cheap and low maintenance fuel). Increases in customer numbers also depend upon the extension of the network of pipelines delivering the gas to new areas of the country which is the responsibility of the engineers. This gives rise to the phrase 'no pipes no sales' which marketing staff will routinely refer to in order to explain poor performance. At the centre of this conventional architecture of inter-dependencies, Finance arbitrates the discussions between the different departments flagging when budgets are overspent or when expected returns do not materialise.

In addition to the normal management and control of the firm, special studies and projects are carried out by the top managers in the management committee. These projects normally fall neatly within the individual areas, but a proportion of these may involve more than one manager, in which case the managers involved

1 Weather analyses are strongly correlated to the consumption of gas of ABC's customers. Thus, they are very useful in explaining some of the variances between actual and budget figures.

2 The safety of the public is always a critical item on the agenda. Good reasons must be produced when delays occur in answering calls involving suspected gas leaks. The increase in road traffic in the Dublin area has further aggravated this problem.

get together in a special meeting to plan and co-ordinate their efforts. Ultimately, all reports are submitted to the management committee.

Thus, a number of important sub-networks emerge from this preliminary analysis of ABC. Clearly, the Management Committee represents the decisional hub of the organisation for tactical matters at least. The functional areas constitute a number of semi-independent sub-networks with little contacts across boundaries except at the level of the management committee. Talking to the Head of Finance, it seems that a number of unofficial groups of social cohesive people (Burt, 1976) operate in ABC and that their membership is regulated by the domain of expertise of their members. Thus, references such as 'the Engineers', 'the Sales people' or 'the pipe layers' are often used in the context of organisational debates.

An analysis of the strategic decision making of this organisation highlights the fundamental role of the Board of Directors, remote from the day-to-day management of ABC's affairs, but very present in the supervision of strategic matters. At this level of decision making, the Board of Directors is not the only important node in the ABC's network; other external actors must be included.

4.3 Extended Network of Actors Shaping the Context of Decision Making at ABC

The previous section describes the internal, formal structure of the organisation we studied. This initial analysis of the relationships between organisational actors must, however, be extended to reflect the density of interdependencies which links ABC to its environment and to add the other internal influences that shape the decision making context at ABC and, therefore, play a role in the elaboration of organisational action. Some external and internal groupings have significant influence on the decision making of ABC and they must be added to the extended network that we are trying to analyse in this case study.

These groups can be classified in four main categories: (1) the 'customer' group, (2) the 'supplier' group, (3) the 'State-related' group and (4) the 'others' group. Overall, approximately 14 groups of stakeholders can be identified to interact and constrain (to various degrees) the decision making of managers at ABC. Figure 3 represents this network of actors using the network analysis techniques of social equivalence and social cohesion which help researchers simplify the complexity of networks by aggregating actors around common positions (shown in figure 3 as groups) either because they play a similar role or because they 'negotiate as one' (Knoke and Kublinski, 1982; Burt, 1976). Figure 3 shows the 14 groups we identified and the relationships that exist between them. Heavier lines indicate strong relationships characterised by tight reporting and transmission of instructions to be executed whereas dashed lines indicate weaker relationships where actors can only attempt to influence each other (as is the case between ABC and the independent agents, such as plumbers, which supply gas services to ABC's clients) or where managers exchange information and opinions through informal mechanisms (as during their trips to the coffee machine or at lunch time).

Figure 3 also represents the boundary of ABC as an organisation including two enclaves (in dashed lines) which can arguably be classified as internal or external stakeholders: the Board of Directors which is appointed by the Irish government and is normally quite protective of the interests of ABC and ABC's contractors who tend to be more self-centred in their behaviour.

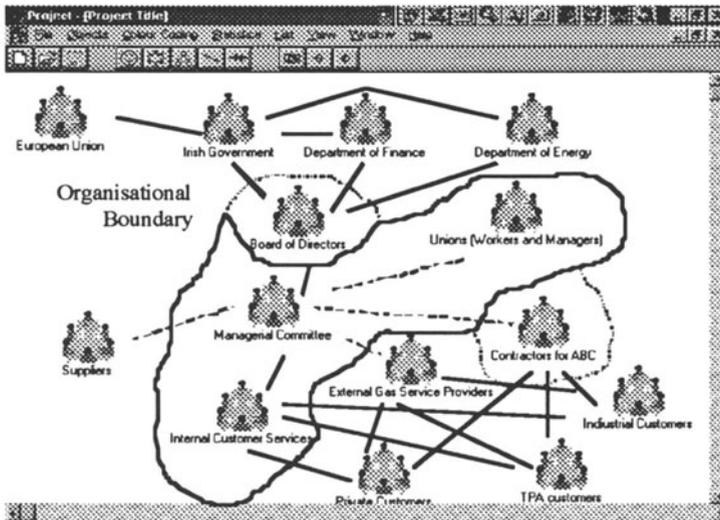


Figure 3 Extended network of stakeholders of ABC.

One interesting feature of ABC's network is that ABC has a tenuous contact with their customers. The only direct contact is in the form of billing and any other promotional material that is sent with the invoices through the mail (plus some over-the-counter contacts when customers come to ABC's regional offices which are located in the major towns). The other two contact points in figure 3 are handled by external agents who have their own agendas and are somewhat outside the control of ABC's management. The marketing staff of ABC spends a lot of time visiting customers, but their effort is often limited to the largest customers. Large industrial customers, because they are important in terms of turnover, are the only customers to be able to enter in private negotiations with ABC and to obtain 'personalised' deals.

More important from the point of view of the context of decision making at ABC is the number of privileged stakeholders in the upper area of the diagram. The European Union only has a diffuse influence but its decisions are enforced by the Irish government and the two administrations directly responsible for ABC. The interviews revealed the important influence of these three main stakeholders whose interests are not always consistent. The Department of Finance is interested in the good health of the organisation in an attempt to maximise the revenues it generates, while the department of Energy is more concerned with ABC being seen

as a 'good European company' operating on a free market and willing to sacrifice its monopolistic position to the ideal of competition and customer service through TPA. The Irish government plays an arbitration role advised by the Board of Directors which it appoints.

The role of the Board of Directors is an important one, which deserves additional comment. As in any commercial company, Board members have a supervisory role in the adoption of the strategic orientation of the organisation. Board members are not normally full time in their capacity, but the Chairman revealed that he worked in ABC's headquarters at least 3 days a week. This can be explained by the frequency of meetings involving board members. Full meetings take place once a month and are the occasion to monitor critical indicators, but other board committees exist such as the audit committee (supervision of the quarterly accounts), the human resources committee (managerial structure, ethics and organisational culture) and the strategic planning committee.

According to the Chairman of the board, the role of the board is not a hands-on one, but one that must include 'setting the tone'. In the list of tasks that the board must carry out, he ranked the adoption of the long term strategy in first position, followed by setting the tone, then the elaboration of the budget, the monitoring of business targets and finally, the proper implementation of decisions. Thus, setting the tone is an important matter which 'nobody else can or will do in an organisation'. The Chief Executive Officer as a member of the Board plays a critical role as a relay between the board and the management committee, but he does not constitute an Obligatory Passage Point (Callon, 1986, 1991) in the sense that top managers are in attendance in the numerous Board committees and have ample opportunities to comment on the reports that are presented to the Board. Thus, contacts are much more frequent than the twice yearly full meetings that are required by the statutes of ABC and there is a certain level of cooperation between the board and the management committee outside the reporting / monitoring relationship that the monthly reviews reveal.

Thus, the decisions made by managers at ABC and the action which results from these come under the scrutiny of a greater number of actors and influencers than would be the case for a normal private organisation. This high level of influence of external sources of power and the existence, at least, three distinct constituencies of shareholders (the three groups of representatives of the Irish State - see Figure 3) means that internal players sometimes feel that they are not totally free to steer ABC in the direction they want. This explains the pro-active stance taken by the management team in relation to the application of the new European rules which aimed at reducing the chances of external (governmental) interference with the management of the firm by addressing the need for change before the legislators moved in. At the interface between the government and the managers in the organisation, the members of the Board (especially, the Chairman who has monthly meetings with the minister for energy) play an important role in adjusting the expectations of either side. As highlighted by the Chairman of the Board, there is no real reason why the relationships between ABC and

its shareholders should not be good. Board members and managers at ABC have a mandate to administer the distribution of gas in Ireland and execute it in the best interest of the shareholders. The board sees its mission in terms of keeping the government happy in the sense that the Irish government owns 100% of the capital of the organisation. Conflicts may only emerge because the shareholders have diverging interests – e.g.; political interest conflicting with financial interest, but otherwise, the relations between ABC and the Irish government are exempt of big surprises. The Board reports to the Ministry for Energy twice a year and monthly meetings take place with the chairman of the Board.

Conflicting views emerged when the decision to extend the network to the West of Ireland was considered a few years ago. The Minister for Energy wanted to show concern for the West of Ireland which is often perceived as receiving less attention than other areas. This was a fashionable political move in a context where pro-West lobbying was intense. However, the guidelines on measuring return on investment used in ABC are established by the ministry of Finance and the tight return on investment required in this instance meant that the extension of the network to the West was deemed an unsafe project and, therefore, was rejected on financial grounds. The Chairman of Board expressed regret for this decision taken by the board. He explained that this decision was not strategically sound in the sense that moving to the West of Ireland is an absolute necessity for ABC. With TPA, competitors will be able to establish a strong presence in the West of Ireland as soon as they enter the Irish market and they will be able to force the government to open a pipe-line to Galway (see figure 7.5) and other major Western cities. As a board member said:

‘Every new house that is built in the West of Ireland and equipped with oil central heating is a lost customer for ABC and, in the present economic context³, that represents quite a large number of customers every month!’

In this instance, the management committee adopted a conservative view supported by the insufficient return on investment calculations of the project and neglected to consider the long term implications of such a move. It therefore neglected to consider cheaper alternatives such as the implementation of temporary storage of gas in tanks (supplied by special trucks) near the major points of consumption or plan for the discovery of off-shore gas near the Western coast line. The Board of Directors followed the opinion of the managers and, doing so, preferred to be seen as being supportive rather than far sighted. At a fundamental level, the situation at ABC is strongly influenced by the very political climate in which all actors operate. This translates into managers and representatives of the government being inherently averse to risk as highlighted by this decision not to extend the gas network to the West.

Downstream from ABC’s managerial decision making, the independent actors in direct contact with ABC’s customers create additional uncertainty for ABC’s managers. Typically, these managers attempt to raise the level of quality of the overall gas service

³ In 1997 and 1998, Ireland has known an unprecedented boom in the number of new houses built, due to a very dynamic economy and government incentives for first time buyers.

in Ireland, but have little visibility on the quality of the service provided by their contractors and the other independent agents (such as plumbers and builders) whose work is critical to the successful usage of gas by a private or industrial customer. Thus, if ABC has control of the expansion of the gas network, they have to rely on a number of intermediaries before gas can be delivered to a specific customer, except for the largest customers who are handled by crews of ABC staff.

This very specific situation of a large organisation caught between powerful shareholders and volatile suppliers of critical services explains much of the decision making that is analysed in this case study.

4.4 Strategic Change at ABC – Meeting the Challenges of Change

The extreme modifications we observed in the external context of decision making at ABC have been analysed by managers and Directors. Based on this analysis, they are trying to implement internal changes in the organisation in order to face up to new challenges. ABC is currently structured around a number of regional agencies such that all functional areas are replicated in all agencies. This is the product of a situation where several local companies were purchased and integrated into a large company under the name ABC. The way the independent companies used to operate has survived to this day even though the regional offices are no longer independent. This means that customers in the South of the country may not receive the same service as customers in the East, but it also means that the information which is provided by the regional offices for the purpose of management control and monitoring of performance is not standardised throughout the company - a situation which does facilitate the implementation of the corporate strategy. Thus, a standardisation of procedures and policies is required not only in the IT area, but in management generally speaking. The IT department is seen as the primary mechanism for such a standardisation and integration of the different regional agencies. Systems, on one hand, and architectures and networks, on the other, must now be developed and implemented in order to enable staff to adhere to the new guidelines. This change is more fundamental than it seems as this standardisation will accelerate the circulation of information from the collection points to the top of the hierarchy and simplify its transmission so that some intermediaries might be by-passed. Strategically, this means that opportunities for information to remain hidden will virtually disappear and that local managers will have to demonstrate a much faster reaction time in addressing problems as top management will become aware of variances and customer complaints more or less in real time. Thus, the managerial implications of this move as regards control are significant even though they are not officially stated in these rather threatening terms.

According to the Chief Information Officer (CIO), the new strategy means that IT must enable and support the re-engineering of organisational processes from a functionally-oriented structure to a process-oriented structure and pro-actively re-design information systems at ABC in order to facilitate such a move. This must

include an analysis of the role of information systems at the level of the overall corporation as opposed to within functional areas or within regional offices.

The CIO also realises that these changes in structures must be supported by changes in the provision and dissemination of information throughout ABC. A new information infrastructure is required to standardise the two-way information flows between headquarters and regional agencies. Failure to implement a reliable information infrastructure could mean that potential gains from the structural changes are simply not achieved.

Another important aspect of the support role IT must play in the implementation of the new strategy resides in supporting the re-engineering of key business processes whereby ABC provides services to customers. As ABC attempts to become a customer-focused organisation their transaction processing systems need to cater for both existing and new services.

The progress of the strategy also requires close monitoring which is being achieved through the instigation of customer satisfaction ratings that measure progress made while also identifying where future improvements might be made and those areas of business that require further attention. This may redress the current weakness of the linkages between ABC and its customers. Also, better management and organisation of the data contained in those systems will make it possible for managers to learn much more about their customers and their needs. The exploitation of this invaluable source of information is envisaged through the hiring of a Business Analyst specifically charged with meeting management information needs and managing ABC's information resource.

In relation to the wider implications of this move, it is also important to note that the IS department which was formerly headed by an IS manager reporting to the Head of Finance is now led by a CIO who reports directly to the CEO and partakes in the management committee (i.e.; the top level committee which is involved in the strategic decision making at ABC). Thus, the IT department will no longer be a mere service department called on by the user population to fix problems or in charge of maintaining the IT infrastructure without a longer term outlook, but will have to proactively develop and implement the systems that ABC needs to accomplish its metamorphosis. This is a sure sign that the CEO of ABC regards the direct access to information of top managers as a crucial monitoring device in order to help them implement the new customer-oriented strategy required for the future; a device which may even enable the CEO to by-pass his heads of department in his information gathering and, therefore, put more pressure on other managers to respect ABC's strategic priorities. As described by the CEO, the ultimate aim of the restructuring is to develop a 'performance management culture' in ABC whereby staff know what criteria and indicators are used to assess their work and these indicators are monitored closely by the organisation-wide information systems. Thus, areas where performance is low will be identified more easily and the reasons for this lack of performance can be analysed in detail.

4.5 Increasing the Contribution of IT at ABC

The increased pressure on the IT department to contribute to a higher degree to the restructuring of the company and to enable the change process has led to considerable thought going into the role and missions of this department on the one hand and the interaction between this department and its users on the other. From an analytical point of view, it justifies that the focus of this research be placed on the IT department and its attempts to involve its users to a much greater degree and develop in the user population an understanding of what Information Technologies can mean for the future of ABC.

The newly appointed CIO's first task was to develop an internal structure which would cope successfully with the new missions of IT as outlined in the previous section. This was accomplished by adding one level to the reporting structure of the department and rewriting job descriptions to achieve better defined but broader individual responsibilities. Because of the nature of the organisation, such an extensive redesign of the department actually requires significant negotiations with the trade unions. The goals of such a change are very clear: they aim at creating an environment where responsibilities, objectives, targets and Critical Success Factors are clearer at both individual and department levels. An increase in the flexibility of the department overall is also sought as the previous structure enabled individuals to shift the priority away from certain types of 'less popular' tasks too easily. One consequence of this move is that a number of current roles may actually disappear as the preparation of information and reports is increasingly handled by the systems. Thus, the need to have many information providers in the local offices may be reduced as top management seeks the information it needs directly on the central servers of the organisation.

While one hierarchical level has been added to the former IT structure, the redesign of the department also allowed a simplification of the reporting lines within the department. Every member of staff reports directly either to the Technical Systems Manager, the Project Manager or the Support Manager. In turn, these three managers and the newly appointed Business Analyst report directly to the CIO, which allows for a faster transmission of information and guidelines. The creation of a new position of Business Analyst deserves some additional comment: it is aimed at developing within IT the ability to deal with and investigate the information needs of executives at ABC. As noted by the CIO, these types of needs have not been addressed specifically in the past and they are best dealt with on a separate basis. The other (related) function of the analyst consists in developing an awareness and a sufficient knowledge of all the systems used in ABC so as to become the information expert of the organisation. This may pave the way for a later development of a data warehousing project which would support the IT plan of providing more proactive support to the user population and enable the move to a more market-oriented and customer-oriented approach.

Thus, the most urgent task of the new CIO was to create and implement the structures and policies that would enable a greater cooperation to take place between the IT department and its users. Furthermore, the CIO wanted to share the responsibility of prioritising IT projects and allocating resources to them with the functional areas as opposed to trying to evaluate their merit solely from an IT perspective. This is currently being attempted by the development of a two-level structure based on an IT steering committee and a number of manager / IT groups as shown in Figure 4; an initiative which was initiated by the IT department.

As the new procedure is being implemented, managers in functional areas are now jockeying for positions in these manager / IT groups which seems to indicate that they have understood the extreme importance of the new structure being implemented and the potential power of such groups once implemented. As indicated on Figure 4, this emergent committee structure is not a redundant reflection of the overall structure of ABC, it is a cross-functional breakdown of the user population which reflects the different types of systems and information problems that the organisation may face in the future. The steering committee is made up of all the top managers of the company including the CEO who also acts as chairman.



Figure 4 Manager / IT committee structure.

The manager / IT groups are made up of 4 to 7 members of staff from different departments involved and the IT project manager who is a member of all groups. Committee members are nominated by their head of department whom they will, in fact, represent. In their first meeting, the groups must elect their chairperson and set out to tackle the first item of their agenda – ie: clearing the backlog of systems development requests that has accumulated over the years. Under the former system, the lack of a formal procedure to assess the merit of information systems proposals has meant that decisions were often postponed. Users would often refuse to make decisions that would solve recurrent problems and IT staff had to spend substantial time trying to work out overly complex compromise solutions respecting all sides'

divergent work methods. In this context, it was really difficult to align the IT strategy with the business strategy.

The new procedure addresses this problem by its reliance on a network of Key Users from different departments. These key users have been selected by their superiors and have been trained in order to develop their abilities to: (1) Specify IT requests, (2) specify bug fixing / maintenance requests and (3) assess the relative merits of IT proposals. It is planned that key users would become sponsors for new projects and act as an underlying network of IT expertise supporting managers in their attempts to develop the use of IT in ABC. This increases the visibility of the flow of requests for systems development and allows a more global approach to the management of the portfolio of corporate applications. When system requests are not in line with the overall strategic change underway at ABC, they can be stopped without resources being wasted.

From the point of view of an outsider, this strategy seems ideal but risky. The key relationship in this model is the relationship between the Key Users and the managers within the functional areas. As noted by the CIO, there is a wide hierarchical gap between these two types of actors and it is conceivable that conflicts may emerge due to the political nature of some of the issues dealt with whereby the managers would disregard the opinions of the Key Users or simply not use them. There is, however, little possibility to by-pass this problem and increase the power of Key Users for example, by using the notion of Obligatory Passage Point. As explained by the CIO:

‘I regard key users as ‘facilitators’ who ‘must’ be consulted by their colleagues and ‘should’ be consulted by their managers. A key user’s authority in my proposal is based on his expertise in a particular area and his potential to keep his manager out of conflict both with the CIO and with his peer managers’.

Nevertheless, the current political ‘game’ (to borrow Crozier’s terminology) surrounding the nomination of the key users and the selection of the committee members is proof of the very high perceived importance of the new structure. If managers had no expectation that the system would work, they would not expend such energy in gaining power in the committees.

Another key aspect of the committee structure that is being implemented will reside in the relationship between the key users and the IT department. In the context of what is being attempted by the new CIO, this relationship should be one of cooperation whereby key users act as representatives of the IT networks within functional areas and facilitate the transmission of feedback from these areas towards the IT department. One can, however, easily conceive of a scenario where key users would feel more allegiance to the functional area to which they belong than to the emergent network of IT expertise. In this case, the committee structure will give even more leverage to functional areas to put pressure on IT staff. At this point in time, it is not possible to anticipate which direction the new structure will take.

The only reliable conclusion is that, if the CIO's participative strategy is to operate according to plan, the committee-based procedure must become self-adjusted and IT / user groups must find a balance between conflict and co-operation in the way they operate. The success of this initiative rests on the ability of the people involved to apply this model for the benefit of the organisation as a whole as opposed to blocking the committee system by an undue attention to their own needs. Another risk that may arise from the model highlighted above resides in managers losing interest in the committee structure and systematically delegating their responsibilities downward. As noted by one manager with some humour, 'it is easy to replace a key user, but more difficult to replace a manager!'. As we see it, this comment does not truly reflect the potential importance that key users may take in the process of implementing information systems in ABC.

The success of this new strategy for the IT department will determine whether managers are successful in adapting the internal processes of their organisation to the evolution in their decision making context. In particular, it will determine whether the contribution of IT in ABC can be broadened to the support of decision making at the highest managerial level; which may pave the way for a greater use of DSS applications in the organisation.

6 CONCLUSIONS

The investigations we are carrying out in ABC are on-going. However, based on the rich data which we gathered so far, some initial conclusions can be reached in relation to the case itself and, in a broader perspective, on the urgent need to understand more about the context in which DSS and, more generally, information systems, are implemented if we are to suggest new ways to improve the contribution of IS in organisations.

Based on our observations, the concept of organisational context can usefully be viewed as a combination of cultural, structural and environmental factors, all of which are shaped by the specific circumstances that an organisation is going through at a particular point in time (as in Figure 1). This context can suitably be captured in the form of a web of influence and information flows linking key actors in an organisation and their relationships with external actors in what can be termed an extended network. This combination of factors and key actors, in turn, influences the decision making processes of managers and shapes the information networks that exist in these organisations. Also, modifications in the context of an organisation (whatever their source: process improvement exercise or modification of the competitive position of the organisation, purposeful management initiated change programme or external pressure, etc.) result in modifications in the networks of this organisation and can be studied on that basis. Thus, the kind of displays that is presented in Figure 3 (extended network of stakeholders of ABC) and the commentaries we proposed in section 4 are critical in understanding the context in which an organisation reaches certain decisions, the resulting

modifications in the organisation's important networks and, ultimately, the changes in the decision making processes that result. They are also essential in understanding an organisation's goals and how these are implemented and enacted by managers on a day-to-day basis.

This research study and the application of network analysis to the analysis of the work of managers indicates that one way of understanding the dynamics that shape organisational context is to study the information webs of organisations. In particular, analysts must identify the important actors (internal and external) and the important networks and study how these networks are shaped during the phases of decision making managers go through. We found these information webs to be dynamically changed by the games of power which are played by managers in different functional areas as actors attempt to modify the information map and obtain advantages over their colleagues in other functional areas, their superiors or, even, their subordinates. Ultimately, as already hypothesised in previous research (Granovetter, 1973; Burt, 1992), it appears that individuals who have the best access to information derive additional power from their position in the organisation's overall network. One novelty of our study was to examine in detail how the implementation of information systems may actually change the balance of power in an organisation and preside over the loss of power and influence of certain categories of staff - the middle managers / information providers of the local agencies in our case - and the resulting increase of control of top management. In ABC, the standardisation of information systems and procedures will signal the end of regional differences - i.e. freedom - and enable the heads of functions to monitor the performance of individuals who, up to now, organised their own information and could therefore report on their own performance. Thus, the major findings of our analysis can be synthesised in the following points:

- *At the level of the organisation as a whole:*

The researcher's ability to capture a rich picture of the information that is circulating in an organisation and of who uses it may constitute a solid and useful basis for the development of relevant DSS applications and also identify the potential user population for such applications. This analysis should not be naïve and should be mindful of the power implications of the distribution of information in an organisation. Managers will never overlook the potentially threatening effect of new IT developments if they mean that information that used to be concentrated in the hands of a chosen few is disseminated to the widest audience of organisational actors. Neither will they ignore the possibilities inherent in organisation-wide electronic communication systems such as e-mail to provide by-passes in the interaction between individuals by creating alternative channels of communication which reduce the power of middle managers who used to be important bridges between clusters of actors. This type of analysis may be critical

in ensuring the success of the implementation of management systems by showing individuals that they stand to win more than they stand to lose.

The investigation of the role and status of the IS department in the structure of an organisation and in its decision making processes is the first step in an in-depth reorganisation of IT matters so that the structure of the IS department and its perception by users are conducive to an increased contribution of IT in organisational affairs. The position of the IS department in the network of an organisation and the ability of the IS Director to play a significant part in the power game may be keys to the future contribution of IT as an organisation seeks to adapt to modifications in its external and internal contexts.

- *For each decision situation where DSS staff are asked to make a contribution to the decision making of their organisation:*

The analysis of organisational networks will result in a better understanding of the decision processes to be supported and of the criteria used by manager in their assessment of the decision situations they face. This knowledge of the often idiosyncratic ways in which teams of managers tackle decision problems will provide a basis for a richer analysis of requirements for DSS applications.

This analysis will also reveal the communication/exchange of information dimension of the decision making processes to be supported and will enable developers of DSS to provide a new dimension of support for organisational decision making: one that is mindful of the decisional networks specific to each decision and which endeavours to support the exchanges of information which take place in these networks.

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8 BIOGRAPHIES

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