INFORMATION SYSTEMS IN SUPPORT OF EMPLOYEE EMPOWERMENT: A STUDY OF MANUFACTURING ORGANISATIONS IN THE UK

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To my parents, Dimitri and Athina Psoinos

for a lifetime of love and devotion.

Abstract

This thesis investigates the role of computer-based information systems in manufacturing organisations that are encouraging employee empowerment. The central proposition of the research is that information systems are not able to empower employees, but they can support the new work practices created by empowerment, depending on the specific organisational circumstances.

A postal survey addressing the top 450 manufacturing organisations in the UK is reported, which reveals the extent and characteristics of empowerment adoption and the main issues arising from the use of IS in this context. These were elaborated in a series of 20 in-depth interviews in selected organisations. While the data from the interviews highlighted the support that IS provide to employees and uncovered some problematic aspects, the further, more detailed study of two large manufacturing organisations enabled a better understanding of the nature of these difficulties. A conceptual framework based on structuration theory was employed for data analysis.

The case studies reported suggest that the interaction between information systems and employees is in many cases problematic, because it continually reproduces the deeper structural properties of the organisation that essentially constrain empowerment. Although the encouragement of empowerment has affected some organisational practices, traditional institutionalised features largely persist. These not only inform the design and development of existing IS, but are continually reproduced through their use and management. However, this research revealed some instances where the interaction between human agents and IS did not reproduce, but rather transformed elements of structural properties. An analysis of these situations provided improved insights into the impact of IS on organisational structure, and their role in both the reproduction and transformation of structural properties.

Our findings suggest that information systems cannot only support employees in their work practices at the level of action, but that they can also trigger a change in the structural properties of their organisation, thus contributing to empowerment. Critical to this transformation, which can be either intended or unintended, is the interplay between various groups of organisational actors and their motivations and interests for change. An improved perspective on the role of IS in unintended transformations of structure is put forward and to conclude, some implications of the research for both IS theory and IS practice are elicited.

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CHAPTER ONE

RESEARCH ISSUES IN THE RELATIONSHIP BETWEEN INFORMATION SYSTEMS AND EMPOWERMENT

1.1 Aim and objectives of the thesis

This research explores the support that computer-based information systems (IS) provide to employees in manufacturing organisations that are adopting strategies of employee empowerment. Empowerment is a management idea that has recently received significant attention, particularly due to the impact it can have on organisational effectiveness (Clutterbuck 1994; Conger and Kanungo 1988; Jenkins 1996; Vogt and Murrell 1990). The encouragement of empowerment influences many organisational aspects, but primarily work practices. Information systems and IT applications are introduced in an organisation with the goal to facilitate the work and functions of employees. As organisations continually have to change to keep up with changes in their

environment, the work and functions of employees change too. This research sets out to assess empirically how existing IS support these different work practices.

By information systems we refer to:

"the means by which organisations and people, utilising information technologies, gather, process, store, use and disseminate information" (UKAIS 1997, p.5).

Empowerment has come to be widely regarded as a potentially effective way to manage organisations (Blanchard, Carlos et al. 1996; Bowen and Lawler 1992; Byham and Cox 1991; Mills 1995). As information is one of the necessary elements for employee empowerment (Bowen and Lawler 1992; Kanter 1984), the role that information systems can play in empowerment seems intuitively important. However, although the importance of information as a resource has been often pointed out, there is relatively little literature that explicitly links empowerment and IS (Brousell 1992; Clement 1994; Wareham, Bjorn-Andersen et al. 1997). This research aims to address this gap in the literature by examining the ways in which IS can support employees in their enlarged responsibilities. As we want to avoid the overly optimistic and technologically deterministic accounts of the potential of information systems that have characterised much of the hype surrounding IT and IS, yet seem quite remote from the everyday reality of many organisations, the research focuses on how existing and established IS fulfil new requirements. Hence the research aims to identify whether and to what extent existing IS in manufacturing organisations support the work practices created by the adoption of empowerment.

The selection of a research topic is influenced by many factors (Galliers 1997), personal interest being one of them. Empowerment is of particular interest to this author as the latest, 'up-dated' version of the management approaches that focus on employee quality of working life and job satisfaction issues (Hackman and Oldham 1980; McGregor 1960). Coming from a mechanical engineering background, the author strongly believes that these are critically pertinent to the manufacturing sector.

Employee empowerment and involvement - as it was more commonly known in the 1970s and '80s - has been a topic of recurring interest in British industrial relations and management practices, particularly in manufacturing (Batstone 1984; Marchington, Wilkinson et al. 1993; Millward, Stevens et al. 1992). Research in employee involvement practices in Britain suggests a growth in the adoption of such new initiatives (Millward, Stevens et al. 1992) and a lasting interest in the notion, even if it has taken a variety of forms through the last three decades (Marchington, Wilkinson et al. 1993).

Such ideas have achieved wide recognition and are compounded by the changes taking place in the organisation of work in the 1990s. Current change initiatives, such as total quality management (TQM) and business process re-engineering (BPR) typically entail some degree of increased autonomy or self-management for lower level individual employees and/or work teams (Jenkins 1996; Kerfoot and Knights 1995; Sayer and Harvey 1997). This trend is reinforced by cost pressures and initiatives that frequently involve delayering and changes in the numbers and roles of middle managers and supervisors (Dopson and Stewart 1993a; Dopson and Stewart 1993b; Lowe 1993; Rose, Marshall et al. 1987), such that lower level employees gain some of the responsibilities which were previously the preserve of management.

This research chooses to focus on manufacturing organisations. Existing research suggests that empowering management practices are adopted more frequently in manufacturing than in service firms, and their impact seems to be stronger than that in service firms (Bowen and Lawler 1992; Bowen and Lawler 1995). Also, historically, manufacturing firms have been the leading adopters of employee empowerment practices (Lawler, Albers Mohrman et al. 1992; Stewart 1992), and therefore can provide a mature context for their study. Furthermore, manufacturing industry constitutes an important application area for the study of information systems. Yet, we join others in noting that it has received little attention compared to other areas in the services industry, such as banking. Kling, Kraemer et al. (1992) note that:

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"Unfortunately, it [manufacturing] has not been well studied empirically by information systems researchers. Given the crucial importance of manufacturing to national economic welfare, the lack of detailed research on the effective role of IT for facilitating high performance manufacturing constitutes a serious shortcoming in our field" (Kling, Kraemer et al. 1992, p.39).

Therefore the role of IS in support of empowerment in British manufacturing is a topic which appears interesting and of relevance to IS, and one which has not yet been explored.

The main interest of this study is individual employees, but as we see through the development of the research, the focus continually shifts between the level of the individual and the organisation. This is not seen as problematic, but rather reflects precisely both the essence of empowerment and the role of IS in organisations (Markus and Robey 1988).

The rest of this chapter introduces the research issues identified within the relationship between empowerment and IS, drawing on the existing management and IS literature. In the first part of our introductory discussion on empowerment we consider the empowerment concept as it has been developed theoretically and identify two main problems; a lack of clarity in its definition and a lack of a deeper understanding of its theoretical foundations. These are exacerbated by inconsistencies in implementation. Consequently we put forward our view of empowerment which has been the basis of this research. The third section of the chapter provides a review of the literature addressing aspects of the relationship between empowerment and information systems. The review is valuable in refining the research questions and in drawing up an original taxonomy of IS support functions for empowerment. The chapter concludes with a presentation of the overall structure of the thesis.

1.2 Empowerment - a different management philosophy

The notion of employee empowerment has appeared in the last decade as a promising trend in management and has become extremely popular within the management literature (Argyris 1998; Ehin 1995; Malone 1997; Mills 1995). It

is worthwhile noting that empowerment is of increasing concern to both practitioners and academics. Numerous articles in popular business journals such as Fortune, Business Week and the Harvard Business Review claim that:

"workers are gaining greater control over what they do [...] [and] self-direction has superseded the doctrine that workers do only what they're told" (Hammonds 1994, p.43).

Various books have been published on the subject (e.g. Blanchard, Carlos et al. 1996; Ketchum and Trist 1992; Vogt and Murrell 1990) and empowerment has received so much attention recently, that a new journal dedicated to its study, called "Empowerment in Organisations" was first published in 1992.

"Empowering service workers has acquired almost a "born again" religious fervour" (Bowen and Lawler 1992, p.31).

The term "empowerment" first appeared in social work (Mullender and Ward 1991). Within the organisation studies and business literature, there are various definitions:

"Its central meaning is to enable people to do things that they would otherwise be unable to do. It means to remove the restrictions - artificial or otherwise - that prevent people from doing the things that it is within their ability to achieve" (Jenkins 1996, p.37).

"Empowerment is, in essence, the transfer of power within organisations from top management to middle management and so on all the way to the front line employees" (Clutterbuck 1994, p.12).

"Empowering people means encouraging them to become more involved in the decisions and activities that affect their jobs. It means providing them with the opportunity to show that they can come up with good ideas and that they have the skills to put these ideas into practice" (Smith 1996, p.9).

In order to clarify the meaning of empowerment, it is worthwhile to trace the history and the foundations of the concept as well as the reasons for its current popularity.

1.2.1 History and origins

Empowerment as an identifiable concept originates about 10 years ago from social work studies where it is still considered one of the main topics of interest (Humphries 1996). The term "empowerment" was first introduced in social work in relation to the support mechanisms needed by groups of less privileged people to fight oppression and injustice (Mullender and Ward 1991).

Yet the ideas behind empowerment have been around for quite a while in the organisation and management literature. The roots can easily be traced back to the socio-technical systems approach (Cherns 1976; Emery 1969; Ketchum and Trist 1992; Pugh and Hickson 1989), to the Scandinavian participative approach and the industrial democracy movement of the 1970s (Blumberg 1968; Emery and Thorsrud 1976; French, Israel et al. 1960), and even further to the human relations school founded by Elton Mayo in the late 1920s (Mayo 1933; Mayo 1949). Self-managing teams were suggested 47 years ago (Trist and Bamforth 1951) and some Procter & Gamble factories in the US were worker-run as long ago as 1968 (Stewart 1992). Even as early as 1976, evidence suggested that the more the individual was enabled to exercise control over his task (autonomy), and to relate his efforts to those of his fellows (teams), the more likely he was to accept a positive commitment to doing a good job (Emery and Thorsrud 1976). These are essentially the principles of empowerment which formed a new challenge to traditional management style and philosophy.

As the inefficiencies of the traditional hierarchical organisation became increasingly highlighted and criticised in the late 1970s - early 1980s, the concepts of empowerment and the importance of the workforce started to become discussed in the USA, which is the focal point of the business and management literature. Although the Scandinavian school of management (Emery and Thorsrud 1976; French, Israel et al. 1960; Sandberg 1982) has been proclaiming similar ideas for many years, they never took off until empowerment became incorporated in the mainstream (American) management literature. The Japanese management style was probably more potent in affecting the USA particularly with the ideas of quality circles, employee participation, and so on[1]. The Scandinavian experience was very successful, but undoubtedly benefited from a particular national and organisational culture and industrial relations situation.

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[1]This research will not focus on Japanese manufacturing practices as they have a totally different background and underlying principles, and employee empowerment - at least as it has developed in the West - is not a feature in their management practices. Notions such as empowerment have to be considered in relation to the particular organisational context to be meaningful, and thus the object of our enquiry is limited to Western manufacturing practices.

As studies of leadership and management suggested that the practice of empowering subordinates may be a principal component of organisational effectiveness (Bennis and Nanus 1985), researchers from the social sciences increasingly prompted management to pay more attention to the notion of empowerment (Conger and Kanungo 1988). Business borrowed the term from social work, and it was first used by Kanter (1977). From her study of a particular large corporation she identified three important general needs for change in the modern industrial corporation: improving the quality of working life, creating equal employment opportunities for women and minorities, and opening opportunities for releasing aspirations for employees to make better use of their talents in contributing to the corporation (Kanter 1977). To achieve these objectives, changes in organisational structures are needed. Kanter (1977) claims that empowering strategies, concerned with flattening the hierarchy, decentralisation and creating autonomous work groups, are necessary. Scott Morton (1991) on the other hand, defines empowerment as the feeling of employees:

"[...] that they can make a difference, that their efforts directly affect the organisation's performance, and that they are able to take on as much responsibility and commensurate reward as they are willing to work for" (Scott Morton 1991, p.21).

Empowerment in its current use combines the two above dimensions, as it is seen as both a relational and motivational construct (Conger and Kanungo 1988). It denotes both the process and the outcome of the process of giving lower level employees the power and the resources to plan, manage and control the work they are involved in. Theoretically the devolution of authority involved in empowerment stems not only from the recognition that a decentralised form of organisation can be more effective, but also from the belief in employee capabilities and motivation (Hackman and Oldham 1980), and the understanding of the need to take more account of human nature in organised settings (Ehin 1995). The empowerment philosophy is the antithesis of the control-based autocratic management paradigm where employees do only what they are told and are seen as having no further contribution to organisational performance (Bowen and Lawler 1995).

1.2.2 Rationale for the current interest in empowerment

Although the foundations of empowerment are by no means new, managerial practices and discourses have changed significantly over the last three decades. As economic contexts and management concerns change, these ideas evolve with them, since they are inseparable from the managerial discourses. Therefore we need to trace the reasons for the current interest in empowerment, which also justify the form it has assumed in modern organisations. According to a study of the Fortune 1000 firms which examined the adoption of employee involvement in the USA, increasing competition is a significant factor in the adoption of involvement and empowerment (Lawler, Albers Mohrman et al. 1992):

> "Simply stated, in this period organisations have felt serious competitive pressures and have therefore been willing to consider management style changes" (Lawler, Albers Mohrman et al. 1992, p.9).

Global competition (Barnevik 1982), and a turbulent business environment (Scott Morton 1991) have put pressure on manufacturing companies to constantly improve efficiency and performance. This pressure has caused concerns in basically four directions: the effectiveness of the organisational structure and the internal processes and procedures it dictates, the need to control costs, the need for flexibility and speed of response to market demands, and the need to improve quality.

The first concern is addressed by business process reengineering which suggests process management instead of function management (Stewart 1992). Hammer and Champy, the "fathers" of BPR argue however, that

> "processes can't be reengineered without empowering process workers" (Hammer and Champy 1993, p.71).

High-performance work teams make up the "post-hierarchical" organisation and business processes form the link between these basic building blocks (Stewart 1992). The organisation of work around processes:

> "permits greater self-management and also allows companies to dismantle unneeded supervisory structures" (Stewart 1992, p.69).

In this organisational design, information flow has to be different and should move straight to where information is needed, supported by the new, sophisticated IT (Venkatraman 1994).

Competitive pressures have also resulted in a concern to cut overhead costs. A very common approach to achieving this goal is to reduce payroll costs and management overhead costs by downsizing and reducing layers of management - especially middle management (Dopson and Stewart 1993).

"During the past decade, 74 percent of the Fortune 1000 companies reported that they had downsized, and 77 percent had reduced layers of management. Sixty-six percent had done both" (Lawler, Albers Mohrman et al. 1992, p.84).

Similar evidence comes from numerous other sources (Gleckman 1993). This reduction in the numbers and layers of management frequently results in delegating more autonomy and responsibility to low-level staff (Klose 1993; Lawler, Albers Mohrman et al. 1992; Mishra and Spreitzer 1998).

"He (the CEO) first eliminated 1,800 or 60% of Frito's management and administrative jobs. By spreading decision making throughout the company, (he) boosted quality... At a snack plant in Irving, Tex., for example, nearly half the managers are gone, and plant-floor operators rather than supervisors check products every hour..." (Zellner 1992, p.59).

Increasing competitive pressures have also been the motive for improved quality and the introduction of total quality management (TQM) (Deming 1986; Juran 1979; Juran 1989). The introduction of TQM takes the quality control function away from particular functional departments and towards individual employees (McArdle, Rowlinson et al. 1995). The focus for the responsibility for quality lies then solely in the hands of those who actually carry out the work (Wilkinson, Marchington et al. 1992). The vehicles for this form of empowerment are normally teams, such as quality circles or other problem-solving teams, or autonomous work groups (McArdle, Rowlinson et al. 1995). Therefore, there can be a decentralisation of responsibility and authority to teams, as these can be effective in quality control and performance improvement.

The demand for flexibility and speed of response has also increased in the recent past, as markets and hierarchies have entered an era of instability

(Kerfoot and Knights 1995). Most traditional control systems cannot detect and respond to operational changes quickly enough.

"The lag is amplified by the time it takes to record, consolidate, transmit, and analyze data, move it up the hierarchy for review, then back down for implementation" (Bartlett and Ghoshal 1995, p.138).

Such circumstances made organisations very slow to respond to market demands and created the need for decentralisation and the empowerment of front-line employees.

"Empowerment can make us great again because it puts authority and decision making in your hands, where it has to be. The world changes too fast for companies to function any other way" (Rothstein 1995, p.22),

says an "inspired" CEO. The empowerment of middle managers and lower-level staff has also been proclaimed as "an innovation-producing mechanism" that harnesses employees ideas for problem-solving and improvements and creates change (Kanter 1984).

All the above noted conditions apply to both manufacturing and service firms alike. There is however a different contextual factor that we believe has made manufacturing companies focus more on the work content of employees and their well-being at work. This has to do with the continually increasing adoption of advanced manufacturing technologies (AMT) (Siegel, Waldman et al. 1997), and is an 'updated' version of the concerns that brought about socio-technical systems theory. Advanced manufacturing technology includes such technologies as computer aided design (CAD) and manufacturing (CAM), as well as computer integrated manufacturing (CIM)[2]. Computer aided manufacturing (CAM) refers to various programmable machines, such as numerically or computerised numerically controlled (NC or CNC) machine tools, software controlled robots or automated materials handling (AMH) systems (Edwards 1989). The impact that these have had on manufacturing organisations and their employees has been significant over the last years

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[2] Although there have been predictions that the two types of computer-based systems will be ultimately linked (particularly under the umbrella of Computer Integrated Manufacturing, (Ford, Ledbetter et al. 1985; Bullers and Reid 1990, Duimering, Safayeni et al. 1993), computerised manufacturing systems and CAM and CAD applications are still considered as distinct from IT and IS. We therefore distinguish between the two and consider CAD and CAM as new and advanced manufacturing technologies, rather than as information systems.

(Dean, Yoon et al. 1992). There is a considerable literature that attempts to study the impact that such technologies have on work organisation and employees, and their human resource management implications (Edwards 1989; Shani, Grant et al. 1992; Siegel, Waldman et al. 1997). Apart from the potentially positive effects that these new technologies might hold (Zuboff 1988), the shopfloor reality of most employees is still very hard and 'inhuman'.

"In so far as taylorism is seen as a system pushing for increasing the division of labour, a movement in the opposite direction seems to become visible, if only due to technological considerations" (Dankbaar 1988, p.47).

Therefore manufacturing firms are more likely to include considerations such as job satisfaction and quality of work life in the rationale for empowerment adoption.

Thus the potential benefits of empowerment range from cost savings (Dumaine 1992) to increased flexibility and speed of response to the market, and improved product or service quality (Shrednick, Shutt et al. 1992[3]; Tausky and Chelte 1988). From all the above, it is clear that decentralisation and the delegation of responsibility and authority to empowered teams and individual employees, have been widely considered recently because they seem to be effective solutions to the current managerial concerns.

1.2.3 Empowerment in contemporary manufacturing organisations

There are numerous case studies describing organisations which are promoting empowerment (some of them extensively analysed in the literature): from the Brasilian Semco (Semler 1993) to Xerox's well-documented "Leadership Through Quality" programme with its emphasis on competitive benchmarking and employee involvement (Kearns and Nadler 1992; Walker 1992), and from the Gaines pet food plant in Kansas (Ketchum and Trist 1992) to Volvo's Uddevalla plant (Berggren 1994); the list is continually growing.

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[3] This case is particularly interesting because it describes the adoption of empowerment in an IS department.

Empowering manufacturing organisations are characterised by work design which is a radical break with Taylorism and Fordism (Berggren 1992). Team autonomy and the decentralisation of decision authority to the shopfloor teams are central features (Shipper and Manz 1992). Teams have full responsibility for their product and own their work: they can decide their own job rotation and overtime schedules, select and hire the people that join their team, and elect their own team leaders and rotate the roles (Adler and Cole 1993). Hourly workers schedule and monitor operations, solve problems, control costs, and do all the planning of labour, materials, equipment and so on (Frey 1993).

Work design is usually coupled by open internal communication (Pacanowsky 1988), flatter hierarchical structure, highly skilled employees (Adler and Cole 1993; Berggren 1994) and an environment of trust. The result for many employees is increased job satisfaction, high morale, and a drive for innovation and taking initiatives. As empowerment becomes more popular, many successful cases have been reported that 'fit' the above model in general terms (e.g., Dumaine 1992; Gleckman 1993; Kanter 1984; Ketchum and Trist 1992; Shrednick, Shutt et al. 1992; Zellner 1994).

However, not all implementations have been successful. As the ideas find more application, problems begin to arise. McArdle, Rowlinson et al. (1995) describe a case of an electronics plant in north-west England, where empowerment was adopted within the larger context of a TQM approach. They argue that the concept of empowerment within the plant has resulted in a system which intensifies work but does not allow workers any input into the decision-making process as promised. In the same context of TQM, Kerfoot and Knights (1995) argue that although the quality movement aspires to flatten structures and empower workers, in reality it frequently renews the legitimacy of "bureau-corporate capitalist organisations".

Similar difficulties were reported in an empowerment effort that faced the strong resistance of senior management (Rothstein 1995). In their own study of the shopfloor experience of workers who were simultaneously subject to

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Human Resource Management (HRM) and TQM, Sewell and Wilkinson (1992) see empowerment and trust as rhetoric and the centralisation of power and control as the reality. Cautious comments are being made as to whether empowerment simply means fewer people doing much more work, with a mere promise of higher job satisfaction in return (Hammonds 1994).

Recently, Argyris (1998) claimed that despite all the attention and effort paid to it, empowerment has not delivered the benefits it promises and still remains mostly an 'illusion'. This failure is attributed to the traditional management systems and their contradictions with the empowerment philosophy and to the change programmes that are usually followed in order to introduce empowerment, which increase these contradictions. In summary, many researchers argue that empowerment seems to be more of a myth rather than a reality in actual practice (Claydon and Doyle 1996).

It is worthwhile to examine more carefully the potential pitfalls and the constraints to empowerment that might be responsible for many of the perceived failures. These have to do both with the conceptual ambiguities surrounding empowerment in theory, but also with the way empowerment is practised within organisations. Both these issues are explored in the next section.

1.2.4 Critical analysis of empowerment

As most discussions on employee empowerment have been management-oriented, they are characterised by a managerialist focus which is limited to descriptions of success stories and recipe lists of 'how to get there'. Although as noted in section 1.2.1 the notion of empowerment has a rich history, most management literature is not illuminated by an understanding of it. It is not surprising then that it cannot account for and explain the complex and contradicting outcomes which surround empowerment. This is exacerbated by the fragmented and diverse approach to implementation that is followed by many organisations in practice. We believe that both constitute major problems in the development of empowerment and in the proper evaluation of

its relationship with information systems. Consequently, we propose a way to address both problems. A comprehensive and detailed critique of empowerment is beyond the scope of this thesis. The interested reader can refer to Eccles (1993) and Claydon and Doyle (1996).

1.2.4.1 Conceptual ambiguities in the definition of empowerment

Although, at first glance, the term empowerment may seem fairly straightforward, like many other 'everyday' terms such as 'power' and 'control' it is surprisingly complex theoretically. Researchers such as Conger and Kanungo (1988), Mondros and Wilson (1994), Mullender and Ward (1991), and Russ and Millam (1995), argue that the term is often used for rhetorical purposes, and has rarely been defined in a clear and well-understood manner,

> "rather it has been used as a catchall for solving all ills within the organisation" (Russ and Millam 1995, p.31).

The vague definition of empowerment seems to have created problems that may jeopardise its long-term success.

The current management-focused literature fails to explore these conceptual problems and so fails to account for the contradictions which often surround empowerment. Firstly, is there a difference between 'being' empowered and 'feeling' empowered? Certain employees may 'be' empowered, according to some 'objective' criteria but for various reasons (cultural, inappropriate comparisons with other staff) might not 'feel' empowered (Conger and Kanungo 1988). On the other hand, management rhetoric and propaganda may be so effective that employees perceive themselves to be empowered, yet this may not match external criteria.

This dichotomy can be observed in the various definitions of empowerment: some definitions involve the notions of responsibility, and transfer of decision making authority (e.g. Peiperl 1996), while others approach it as a motivational construct, placing emphasis on perceptions and beliefs of power and competence (Klose 1993; Mondros and Wilson 1994), control and self-

efficacy (Conger and Kanungo 1988; Keller and Dansereau 1995; Parker and Price 1994).

We would be sceptical towards the latter definitions, as by focusing on employees' feelings and perceptions of autonomy, companies might restrict their efforts for 'real' structural changes and simply use the term as rhetoric and propaganda. Empowerment needs to involve some more 'external' differential of power, in relation to what the actor could or could not do previously.

Related to this point is the second conceptual issue of whether empowerment has to come from within the individual, or whether the organisation can indeed empower its employees. The way most companies approach empowerment seems to be through an organisational change initiative which alters various procedures and responsibilities and urges employees to be more innovative, more responsible and so on. Thus although in many cases empowerment is proclaimed to come from within, often companies try to encourage it from the outside. Bowen and Lawler (1995) emphasise the need for high-involvement practices that create in employees an "empowered state of mind", while Argyris (1998) stresses internal commitment and employee personal reasons and motivations.

The issues of personal motivation and self-control are complex notions that have been addressed by organisational theorists for many decades now (Hackman and Oldham 1980; McGregor 1960). Nevertheless we believe that the way employees feel about themselves and their part in the organisation is not independent of the organisation itself:

> "[e]mpowered employees' feelings about themselves and their work are a result of well-designed, systematically implemented organisational practices and procedures" (Bowen and Lawler 1995, p.75).

> "A state of empowerment, in truth, can only come from within an individual. [...] yet those in management can create extrinsic conditions which help lead employees in the direction of attaining empowerment" (Beach 1996, p.29).

This issue is closely related to the dichotomy between structure and agency and their relationship which has been a core concern of social theory

(Giddens 1984): although empowerment is approached as a structural phenomenon, it has to stem from the agent. Our view is that in practice, if organisations approach empowerment as if it is only up to the individual to suddenly feel empowered, then nothing really happens; there is no removal of the external constraints and management just urges employees to work "more and better". We argue that successful empowerment must deal with both structure and agency, thus creating motivation from within and aligning the external contingencies to fit employees' new views and expectations.

The third issue is whether there is a difference between 'participation', 'involvement' and 'empowerment' or they are all synonymous. It is possible to argue that there has been a steady shift from industrial democracy to participation and involvement, and that the latest form that this trend has taken is employee empowerment (Batstone 1984; Marchington, Wilkinson et al. 1993). Throughout the literature though, these terms are too often used interchangeably (see e.g., Lawler, Albers Mohrman et al. 1992; Marchington, Wilkinson et al. 1993; Millward, Stevens et al. 1992), with little critical discussion of their common foundations and emerging contradictions. This confusion could be responsible for some failures attributed to empowerment, particularly in the light of increasing research findings that question the notions of employee involvement and participation and point to their inefficacy, except at the level of rhetoric (Fantasia, Clawson et al. 1988; Marchington, Wilkinson et al. 1994; Ogden 1992; Wagner 1994). Although there are significant common foundations in these approaches and they are all related, we do believe that a more careful understanding of each and their differences is necessary.

The term 'involvement' has been particularly popular in British industrial relations where it denotes various strategies that aim to increase employees' awareness and responsibilities in the operation of their company. Such strategies include a wide and diverse set of activities ranging from quality circles and autonomous work groups, to employee reports, briefing groups, joint consultative committees and share ownership schemes (Batstone 1984; Marchington, Wilkinson et al. 1993; Millward, Stevens et al. 1992). Apart from

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the autonomous work groups, these structures do not entail any delegation of decision making responsibility to employees (Collins 1995).

A similar confusion is noted when activities aimed at promoting employee participation (Marchington 1980; Russell 1988; Tausky and Chelte 1988) are regarded as empowerment. Mumford defines participation, borrowing from French, Israel et al. (1960), as:

> "a process in which two or more parties influence each other in making plans, policies or decisions. It is restricted to decisions that have future effects on all those making the decisions or on those represented by them" (Mumford 1983, p.22).

The same principle of influence is found in most other definitions of participation, e.g.:

> "participation is a process in which influence is shared among individuals who are otherwise hierarchical unequals" (Wagner 1994, p.312).

Therefore, what participation really implies is that the centre of authority and decision making rests with management and employees are included only in decisions that affect them in an obvious way. The centre of decision-making power does not move (Fantasia, Clawson et al. 1988):

> "participation would not appear to alter the balance of control in any significant way" (Marchington 1980, p.177).

We would argue that this point constitutes the first major difference between empowerment, involvement and participation, related to a 'transfer' of decision making authority and discretion to employees. Whereas in both involvement and participation, management retains control over the implementation of ideas and suggestions and work design, in empowerment employees have - at least to some degree - authority to make and implement their own decisions.

This transfer of power (yet always partial) also signifies a change in the organisational hierarchy. This constitutes the second major difference between involvement and empowerment. The activities aiming to promote employee involvement are usually parallel organisational structures, as they run in parallel with normal day-to-day work processes, without disturbing them

in any way. These are an 'add-on' to the organisational hierarchy which still defines how the company is run on an everyday basis. This point is exemplified in Kanter's (1984) work where she describes problem-solving action groups that formed a "parallel participative organisation" and concludes that:

> "[a]n innovating organisation needs at least two organisations, two ways of arraying and using its people. It needs a hierarchy with specified tasks and functional groupings for carrying out what it already knows how to do [...]. But it also needs a set of flexible vehicles [...] for encouraging entrepreneurs and engaging the grass roots as well as the elite in the mastery of innovation and change" (Kanter 1984, p.205).

In empowerment, no parallel organisation exists separately; its activities are integrated to the hierarchy and to the everyday running of the company[4].

It should also be noted that both employee involvement and empowerment differ significantly from industrial democracy; the former assume that management might see the advantages of allowing employees to become involved and "hand over" power and authority, whereas industrial democracy proclaims the right of employees to exercise some control over those in authority (Marchington, Wilkinson et al. 1994). (For a more extensive discussion on empowerment, participation and democracy see Collins 1996 and Fantasia, Clawson et al. 1988).

1.2.4.2 Practical inconsistencies in the implementation of empowerment

The problems of conceptualising empowerment are further exacerbated when we consider empowerment as it is practised within organisations. In efforts at organisational change that aspire to TQM or BPR principles, empowerment is frequently seen as a key ingredient for success (Lawler, Albers Mohrman et al. 1992). However, such change programmes typically aim primarily at organisational efficiency, effectiveness and cost reduction, and treat empowerment in an instrumental fashion. In such cases, empowerment is too easily treated as an empty rhetoric or a fortunate by-product.

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[4] Similar concerns have been common in the quality movement where " [t]he most important condition for the successful take-off of quality improvement appears to be finding a way of integrating it with operational activity, so that there is not in fact a parallel 'quality organisation' vying for attention and resources with the main operating structure" (Neumann et al. 1995, p.150).

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Employee empowerment in the quality movement

Employee empowerment has been proclaimed as an element of the quality movement from its beginnings. Juran (1979) refers to the process of delegating the responsibility for quality to the point of production as "worker empowerment". Particularly evident in the writings of Deming (1986), empowerment is seen as a necessary requirement if quality is to be achieved in every individual's contribution to the production system. Oakland (1989) advocates that all employees should be incorporated in the decision-making process of the organisation.

> "Quality can be a compelling value in its own right [...]. Everyone at every level can do something about it and feel the satisfaction of having made a difference" (Pascale 1991, p.248 quoted in Wilkinson and Willmott 1995).

Bowen and Lawler (1995) contend that employee empowerment should be implemented as a separate change initiative from those of BPR and TQM. They point out that TQM programmes emphasise rewards less than employee empowerment approaches do, and that TQM tends to be more top-down than empowerment. Nevertheless they accept that:

> "the image of the relationship between the two is usually that employee involvement[5] is part of a TQM program; far less often is TQM part of an employee involvement program" (Bowen and Lawler 1995, p.81).

In the quality and continuous improvement movement there is a decentralisation of responsibility and authority but it is confined to the process by which responsibility for quality is pushed down the organisation to the point of production (Sewell and Wilkinson 1992). There are claims that job redesign in TQM often results in tightly controlled, simplified work and allows limited discretion to the employee as to how to perform his/her task (Bowen and Lawler 1995).

Total quality has a very unclear position on empowerment and therefore many TQM implementations are problematic in terms of empowerment: in one of his most popular quality "bibles", Crosby (1979) finds that:

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[5] Bowen and Lawler (1995) (confusingly) use the term involvement and empowerment interchangeably.

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"[a]lthough individuals at lower levels can add to the deterioration of a process, there isn't a great deal they can do to improve a product or service. It makes you wonder why so much attention is given to improvement in those areas and so little to management and administration. If effective quality management is to be practical and achievable, it must start at the top" (Crosby 1979, p.19).

But at the top is where it mostly stays too. When prescribing the steps to implement quality, Crosby (1979) emphasises that the quality improvement team should comprise departmental heads in order to commit their operation to action. Managers and supervisors are the ones that receive training and are supposed to then "orient employees" and explain the steps to their people. A strong division is evident between managers and staff:

"A formal orientation with all levels of management should be conducted prior to implementation of all the steps" (Crosby 1979, p.116).

The contribution that employees may have to the quality process is so limited that when individuals are asked to describe any problems that keep them from performing error-free work, Crosby (1979) notes:

"This is not a suggestion system. All they have to list is the problem; the appropriate functional group (e.g. industrial engineering) will develop the answer" (Crosby 1979, p.117).

The confusion does not seem to recede with the maturity of TQM. More recently, Powell (1995) proclaims that tacit, behavioural features such as open culture, employee empowerment and executive commitment drive TQM success and not TQM tools and techniques, while Randeniya, Baggaley et al. (1995) identify empowerment as a leading cause for the failure of many TQM programmes and recommend that in order to revive TQM, it should be abandoned.

Empowerment in business process reengineering

Similar inconsistencies have been highlighted for the role of empowerment in BPR (see Willmott (1995) and Boudreau and Robey (1996)). As one of the major changes that occur when a company reengineers its business processes, Hammer and Champy (1993) note that people's roles change - from controlled to empowered. They proclaim that as teams assume the responsibility of completing an entire process, they must also be given the authority to make decisions in order to get things done. The 'automatic' way in

which employees are empowered in BPR can be observed in Hammer and Champy's (1993) terminology:

"People working in a reengineered process are, **of necessity,** empowered. [...] Teams, of one person or several, performing process-oriented work are **inevitably** self-directing. [...] If they have to wait for supervisory direction of their tasks, they aren't project teams. Empowerment is an **unavoidable** consequence of reengineered processes" (Hammer and Champy 1993, p.70-71, emphasis added).

By naming empowerment an inevitable consequence of BPR, Hammer and Champy (1993) avoid the difficult task of explaining how teams actually become empowered and the complex issues that surround them, given that BPR strongly reinforces the hierarchy. However in BPR empowerment:

"does not necessarily release control but does change the way control is exercised" (Sayer and Harvey 1997, p.428).

Also BPR's emphasis on leadership, the key role of senior managers (Willmott 1995) and its top-down approach could be perceived as not demanding any significant decentralisation of authority (Jones 1994). Hence, it should come as no surprise that in a review of BPR practices in Britain, many organisations were found attempting little in the way of either culture change or work design change (Childe, Maull et al. 1996).

Although empowerment can be a part of both TQM and BPR, it should not be seen as inherent or as an automatic outcome of them; in many cases there is a gap between the promised empowerment and the concrete actions taken to achieve it (Boudreau and Robey 1996; De Cock and Hipkin 1997). The issue of empowerment within TQM and BPR is raised again in relation to our empirical findings in Chapter 4.

1.2.5 Empowerment as the decentralisation of decision-making authority

These criticisms of TQM and BPR put in question the character of empowerment in these approaches on the one hand (De Cock and Hipkin 1997), and on the other, demonstrate the need for a clear definition of empowerment and its scope. In its original meaning, to empower means to "authorise, give power to" (Tulloch 1993) and accordingly, we argue that central to the concept of empowerment, is the delegation of power to staff to

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make and implement decisions on their own. These decision making responsibilities range from those that are invariably involved in task execution to those involved in task design. Thus employees assume more authority to control the coordinating, allocative, improving and control functions associated with their tasks.

Although as Argyris (1998) rightly notes, empowerment is a goal that organisations can work towards, approximate, but never quite reach, so there can be various levels of empowerment, we believe it is critical that attempts at empowerment are focused on decentralising decision making authority to employees. By defining empowerment as decentralisation of decision making authority we can capture the broader changes that are necessary for empowerment to be anything more than rhetoric. In empowerment the decisions made by workers do not merely concern the internal regulation of the system but may go far beyond that. Hence empowerment challenges the effectiveness of traditional management roles and transforms the organisational structure. Thus it should by no means be perceived and equated to having a suggestion scheme or a few additional briefing sessions. Empowerment necessitates much more than that, and organisations and researchers should fully appreciate the extent of changes required before they conclude that empowerment "does not work" or does not deliver the expected benefits.

We argue that empowerment has to be seen as a new management philosophy which contradicts the bureaucratic organisational paradigm. This view of empowerment is supported by various related issues of current concern. We believe that in order to obtain the personal benefits that empowerment is supposed to entail for employees, autonomy should be pursued. There is plentiful evidence that high levels of worker control over decision making are associated with high levels of psychological well-being and job satisfaction (Hackman and Oldham 1980; Parker and Price 1994; Pearson 1992). Consequently, employees feel a strong sense of commitment to their work and derive satisfaction from their achievements, which lead to increases in productivity, quality and effectiveness.

Furthermore, just telling employees that they are empowered while maintaining around them the traditional command-and-control structures and practices will undoubtedly lead to nothing, as employees will be most certainly constrained by the traditional organisation in every step they take. Finally, a common problem with involvement and empowerment initiatives is the lack of continuity in the sense that as soon as the manager who is the champion of the scheme moves on, the scheme often collapses (Marchington, Wilkinson et al. 1993). If structural changes are made to support and strengthen the scheme, even if the driving force behind it leaves, the structural changes will prohibit the organisation from 'slipping' back to the previous state.

This need for more holistic changes in the organisational structure in relation to empowerment has also been emphasised by other writers: Eccles (1993), Jenkins (1996) and Ketchum and Trist (1992) point out that:

> "empowerment policy will not work unless people are freed from existing organisational constraints to achieve things that they currently cannot. That means that to change the organisation is an essential precondition for success" (Jenkins 1996, p.42).

This point is also highlighted by Bowen and Lawler (1995) who stress that:

> "organisations must change their policies, practices, and structures to create and sustain empowerment" (Bowen and Lawler 1995, p.73).

Although it is wise to stress the need for some fundamental broader changes in the organisation, we need to highlight that empowerment is not an 'all or nothing' option. There are levels of empowerment that an organisation can achieve and empowerment is something that is likely to demand a great amount of time for most conventional hierarchical organisations (Ketchum and Trist 1992).

In the previous sections we provided a brief summary of the ideas behind empowerment, its history and origins and the relevancy it holds for contemporary manufacturing organisations. A critical examination of related concepts helped to clarify its meaning, and locate its contribution within the management field. The way in which empowerment has been implemented in practice though, frequently fails to be consistent with its main principles. Despite the critique, this research needs a clear definition of empowerment in

order to proceed with the study of how IS can support it. Hence in this section we presented our view of empowerment which serves as the basis for this research. The issue of the definition of empowerment is raised again in Chapters 4, 5 and 6 in relation to our empirical findings.

A change towards empowerment involves several initiatives to alter structures, procedures, relationships and culture (Neumann, Holti et al. 1995). As one way to approach the necessary changes, most current supporters of empowerment proclaim that there are four common points that characterise empowering organisations: the provision of information, power, knowledge and rewards to employees[6] (Bowen and Lawler 1992; Bridges 1994; Lawler, Albers Mohrman et al. 1995).

Effective and appropriate IS can support the distribution of information and knowledge:

> "Lots of companies talk about empowering their employees - giving them all this authority and responsibility - but if they don't have the information to back up the responsibility and the authority, they don't have the where-with-all to act" (Brousell 1992, p.121).

It is on this apparent relationship between information systems and empowerment that we will focus in the remainder of this chapter.

1.3 The relationship between information systems and empowerment

Until quite recently there had been very few papers in the mainstream IS literature linking employee empowerment and IS. These mainly address the issue of decentralisation and delegation rather than deal directly with empowerment in its present form. Recently though, a few papers have emerged that explicitly deal with IS and empowerment. These are discussed first, but we note that they are each the outcome of a long line of work in IS

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[6] These are obviously related to the various means in which organisations have attempted to enhance employee interest and commitment to management goals in the past. For example employee reports that aimed to provide company information directly to employees have been popular since the '70s (Batstone 1984; Marchington et al. 1993).

and various related aspects of organisations; as empowerment became popular, researchers seem to have turned their attention to linking IS more specifically to empowerment.

The work that forms the background for this study can be divided into two broad categories: the first addresses the impact of IT/IS on the structural elements of organisations and therefore approaches organisational issues on a macro level (Markus and Robey 1988; Orlikowski and Robey 1991; Swanson 1987). The second looks at the impact of IT/IS on individuals and thus focuses on a micro level. As we discuss further, these two directions are a result of the strong divisions between structuralism and objectivism that have characterised the social sciences in this century (Giddens 1984; Orlikowski and Robey 1991).

1.3.1 Information systems and decentralisation

The first group of work in the relationship between IS and empowerment is centred around the issue of decentralisation and examines whether IS and IT lead to more empowered employees and decentralised organisational structures. The most recent work that explicitly addresses empowerment are the papers by Wyner and Malone (1996) and Malone (1997). The first paper presents a new model linking IT and the structure of organisational decision making. It provides support for the argument that new information technologies are leading to decentralisation and empowerment;

"[our model] suggests, for example, that recent trends toward "empowerment" are not just a fad, but are a response, enabled by new information technologies, to fundamental changes in the economics of decision-making" (Wyner and Malone 1996, p.63).

The model distinguishes between unconnected and connected decentralised decision makers and focuses on the location of decision making and the information that is used in it. The model predicts that unconnected decision makers are common when communication costs are high; as communication costs fall, centralised decision making should become more economically efficient. Finally as communication costs fall further, connected decentralised decision making becomes the most cost-effective solution in many cases. As

new information technologies reduce communication costs, they will lead to the different decision making structures. However, although the authors recognise that there are many other factors that affect an organisation's decision making structure, the model takes into account only two factors: the value of the remote information used in a decision and the costs of communicating the remote information needed for a decision.

The model also accepts economic efficiency of the various decision making structures as the only significant factor that determines the choice of centralisation and decentralisation in organisations. The authors specify that they expect the model to apply when two conditions hold:

> "[that] there is no set of other factors whose combined effects over time outweigh the influence of changing communication costs [and] efficiency concerns play some role in the choice of organisational structure and thus there is some tendency for organisations to actually move toward the optimal structures predicted by the model" (Wyner and Malone 1996, p.72).

We believe that indeed there do exist many other considerations, mainly socio-political in nature that determine organisational structure and responsibilities, which compromise the validity of the model in "real-life" organisations. An attempt to consider other factors is made in Malone (1997), where the author employs the model to explain various organisational structures, highlights the issues of trust and motivation and briefly examines how IT relates to them. He then goes on to propose "radical decentralisation" as the optimum way to fully exploit new IT:

> "most discussions about empowerment stop half-way, at the middle of the decentralization continuum. By definition, you cannot empower someone unless you have the right to make or overrule the decisions you are delegating. But radical decentralization is not something that people at the top do for people at the bottom; it is something that starts at the bottom" (Malone 1997, p.32).

By this Malone too, acknowledges the paradox that characterises empowerment as noted above in Section 1.2.4.1.

But these papers are only the most recent interpretations in a long line of work examining the impact of IT on the structure of organisational decision making (see e.g., Ang and Pavri 1994; Attewell and Rule 1984; Grochla and Szyperski 1975; Huber and McDaniel 1986; Wijnhoven and Wassenaar

1990). Leavitt and Whisler have been recognised as the ones commencing the debate, when as far back as 1958 they predicted that the use of computer-based IS would lead to the centralisation of decision making in organisations (Leavitt and Whisler 1958). In 1975, Emery also predicted that:

"if an advance in information technology reduces these costs of coordination (without also causing a corresponding reduction in the costs of independence), the optimum point shifts toward greater coordination and integration" (Emery 1975, p.99).

George and King (1991) present the four main positions in the centralisation debate: that computerisation causes centralisation, that computerisation causes decentralisation, that decision making structure is determined by factors other than computerisation (known as the 'no-inherent-relationship' view) and finally that computerisation reflects rather than causes (de)centralisation, as organisations shape their computerisation efforts to conform to their pre-existing structures (George and King 1991). After a careful analysis of these positions, they conclude that they can be reconciled with the consideration of managerial intention and action. Based on a 'managerial action imperative' model that takes into account external, historical and cultural constraints, they recognise a tendency toward the use of computerisation as a means to reinforce and reflect the decision making status quo.

The more modern forms of IS have been examined under the same light. Huber (1990) puts forward a set of propositions portraying the effects of advanced IT on organisational design, intelligence and decision making. Distinguishing between computer-assisted communication and decision-aiding technologies, he predicts that for a highly centralised organisation, use of these technologies leads to more decentralisation, while for a highly decentralised organisation, their use leads to more centralisation (Huber 1990). These propositions contrast George and King's reinforcement politics perspective.

Gurbaxani and Wang (1991) studied the same issue and argue that:

"as decision-making rights are pushed downward in the organisational pyramid, the costs of communicating information upward decrease while agency costs resulting from

goal divergence increase. Therefore, decision rights in an organisation hierarchy should be located where the sum of these costs is minimized" (Gurbaxani and Whang 1991, p.60).

As modern IT can reduce the costs of communicating information, it can improve upper management's decision making, leading to more centralised management. However, at the same time, IT can also provide management with the ability to reduce agency costs through improved monitoring and performance reporting capabilities, causing decentralisation of decision making. Therefore the 'net' effect of IT on the location of decision making is not definitive. They even envisage that a single firm may use IS to both effects: to decentralise some decisions and to centralise others, taking advantage of the particular circumstances and leading to a hybrid structure.

1.3.2 The effects of information systems on individual employees

In the second group of work relevant to the study of the potential role of IS in empowerment, we include research which has focused on the impact of IT/IS on individuals (of particular interest is the study of middle managers and employees). This research addresses various diverse issues such as the provision of information, access to computers and the effects of computerisation, but we classified it in one category because its main unit of analysis is the agent (individual employee) as opposed to structure (organisation).

As noted above, Bowen and Lawler (1992) see the dissemination of information about organisational performance (e.g. operating results and competitor performance) to the lower levels of the organisation as one of the four key features of empowerment. Since IS can support this, they seem to be directly relevant to empowerment. Jarvenpaa and Ives (1994) also highlight 'empowered knowledge workers' as critical for the network organisation. They claim that this has implications for IT and put forward examples of firms that report daily performance indicators (such as world-wide sales or current stock price) through sophisticated IS, directly to employees.

"Such systems can help focus employee and team efforts toward the problems and opportunities facing the broader organisation" (Jarvenpaa and Ives 1994, p.41).

Real-time feedback and complete access to information is also seen as valuable for employees. In a similarly futuristic and optimistic tone Hoffman (1994) sets out an IT vision to support a federated organisation:

> "to support worker empowerment throughout our enterprise, we will be prepared to provide every worker with all information relevant to that worker's job and its effect on the company as a whole" (Hoffman 1994, p.55).

"Empowered" employees require information that extends beyond the business process in which they participate directly, in order to make the right decisions. For example, if production capacity is limited, the employee responsible for scheduling production needs to know which customers are most important, what they have ordered, how long they have been waiting for their delivery, and so on. All this information can most easily be accessed via an information system.

The importance of information for empowerment has made researchers declare IT and IS as critical. Clement (1990) examines the use of desktop computers by secretaries and the co-operative solutions they developed to deal with the difficulties they faced in their use of computers. Kanter notes that "the powerful are those with access to the tools for action" (Kanter 1977, p.166). While she makes no specific reference to computers, Clement contends that their relevance in this context is obvious:

> "Many organisational actions involve the performance of information processing tasks that are amenable to computerization and thus expanding the capabilities of computers and extending their availability to a wider group of people can clearly be regarded as a process of empowerment" (Clement 1990, p.224).

While he focuses on the difficulties with 'access' and the view of a computer as a 'tool', our main objection would be that we cannot deduce that computers are tools for action as in most cases the employees that use them do not have the freedom to "act" but merely follow orders. The basic assumption is that IT can enhance the power of 'weak' office workers:

> "Transforming a given computing facility into an effective tool for action and realising some of **its empowering potential**, typically involves users in a prolonged process of learning and adaptation" (Clement 1990, p.224, emphasis added).

He presents data from two studies of office staff who were facing particular difficulties in using PCs, essentially for word processing. To cope with these difficulties secretaries developed cooperation networks to help each other. These enhanced their use of computers and their control over the technology. These perceptions of greater control were not limited to their interaction with IT; subsequently, office staff appeared more 'powerful' in their relationship with management.

Although Clement seems to imply that the greater control over their interaction with computers led secretaries to assume greater power in their dealings with management, the role of IT in all this is questionable: the strengthening of social relations through collaboration seems more responsible for their "empowerment" compared to the use of IT. Furthermore, we can envisage similar social dynamics developing around any other form of technology; the secretaries seem to be particularly concerned about the way they had been treated over computerisation, but this could have happened with any introduction of new technology.

This point precisely is picked up in Clement (1994). The focus again is on low-status women office workers and the consequences of computerisation on their work. Three cases are discussed where workers became successfully involved and made contributions to the technological reform and beyond.

"Computerization serves not so much as an empowering tool, but as the catalyst and occasion that expands the possibilities for organisational realignment and empowerment. The constraints and opportunities presented by technological change help in opening 'spaces' in organisational life within which the staff can bring to the surface long submerged concerns" (Clement 1994, p.61).

The background to this line of work is the literature on the effects of IT/IS on individuals; employee job satisfaction, productivity and skills have been studied since the first days of computerisation (Attewell and Rule 1984; Kling 1991; Orlikowski 1992a). Although there has been substantial work on the impact of IT/IS on the individual level, clear conclusions have not yet been reached (for reviews of IT impact research see e.g. Ang and Pavri 1994; Orlikowski 1992a; Wijnhoven and Wassenaar 1990). A significant amount of this research focused on the manufacturing environment: Shaiken (1984)

describes the effects that interlinked information systems can have on workers in car plants.

> "Information-gathering systems can be designed in a way that provides more data for autonomous and decentralized decision-making or they can seek to monitor every aspect of what a worker does on the job. The issue is not the value of timely information to coordinate production but the collection and use of data in a way that seeks to extend managerial authority" (Shaiken 1984, p.177).

Machine and maintenance monitoring systems enable a much closer surveillance of the activities of the worker at the machine, and can limit his/her control over the pace of the job.

Hodson and Parker (1988) report similar findings where advanced computer systems enhance hierarchical control, and create heightened alienation and stress, usually having negative implications on job satisfaction. More recent empirical work which employed the job characteristics model developed by Hackman and Oldham (1980), suggests that computer-based IS have a positive effect on the job satisfaction and motivation of end-users (Ryker and Nath 1995).

However apart from constant surveillance and monitoring there are other ways in which IS can contribute to the control of employees' activities without stifling creativity and innovation. Simons (1995) examines the ways in which senior managers protect their companies from risk when empowered employees are encouraged to make their own decisions and be innovative. He describes four levels of control: diagnostic control systems, beliefs systems, boundary systems and interactive control systems. Interactive control systems are usually strongly dependent on computer-based IS, share new information and help managers involve themselves in subordinate decision making on key issues. Interactive control systems deal with continually changing information that is deemed potentially strategic and which forms the basis for face-to-face interaction and debate. In this way, the interactive control system "focuses attention on the strategic uncertainties that managers want everyone to monitor" (Simons 1995, p.88), while maintaining control on all levels. Although Simons does not refer to IS as such, his research has implications for IS and empowerment. Thus the role that IS can

play in ensuring control in an empowering organisation can range from the tight constant surveillance of operators to the more indirect provision of information to ensure that the efforts and attention of all members are focused on the right priorities. Once more it is the empowering organisation that decides how and for what purpose the technology will be employed to support employees.

1.3.3 Technological changes complementing empowerment

However, both the above noted groups of work on the relationship between IS and empowerment (or decentralisation) - except perhaps the latest paper by Clement (1994) - seem to aspire to a 'moderated' technologically deterministic view where the technology is seen as the independent variable that impacts organisational aspects at various levels (George and King 1991; Orlikowski and Baroudi 1991). Recently more sophisticated approaches to the relationship between IS and empowerment have emerged that tend to study technological advances - usually with the introduction of a new IS - that are complemented by organisational changes in the direction of empowerment, or vice-versa.

For example, Wareham, Neergaard et al. (1997) describe a case study where the introduction of a performance monitoring system tracking the activities of over 150 service technicians was complemented by an organisational redesign based on empowerment. When the information system was initially introduced, it was met by strong resistance from employees who were essentially troubled by the use of measurements to demonstrate their inadequate performance. Thus the company decided to embark on an empowerment programme which transformed the traditional hierarchical structure to a three-tier team structure and established the technician team (a team of five to eight technicians) as the primary operating unit of the service division.

Responsibilities for planning, goal setting and performance evaluation were delegated to team level. Therefore the information that the system was

gathering was useful for both management and the technicians, and the "bottom-up" information flows that were characteristic of the traditional control context were replaced by an interactive control mechanism with two-way information flow. The study exemplifies the need to align IS with organisational structure and policies, and stresses that the introduction of IS cannot cause the categorical elimination of traditional hierarchies (Wareham, Bjorn-Andersen et al. 1997). It rather suggests that:

> "the manner in which the information is utilised within the organisation is entirely a matter of management discretion" (Wareham, Neergaard et al. 1997, p.1404),

but is also critical in the realisation of the benefits of IS.

Sayer and Harvey (1997) discuss a case of the use of electronic mail as a key enabler in implementing reengineering, promoting employee empowerment and denying the bureaucratic hierarchy. In their case of a government department in Queensland, the senior manager saw e-mail as a means to bypass the hierarchy and open up communications to all employees. In particular, the traditional hierarchy placed middle management as central in the information flow in the department. The establishment of direct and open communication, took communication control away from middle management. At the same time though, the senior manager directed all users to e-mail a copy of all messages to him. This

> "process allowed for the freeing up of information while also introducing surveillance as control through the technology of cc:Mail" (Sayer and Harvey 1997, p.433).

This case demonstrates the power of organisational actors to use the same IS to totally different effects.

Mitev (1996) similarly discusses the role of IT and IS in BPR and suggests that IT-induced organisational change reinforces management control and:

> "increases efficiency through oiling and diluting issues of power relationships by providing technology-based "equal" access to organisational information and knowledge" (Mitev 1996, p.64).

1.3.4 Defining a relationship between empowerment and IS

The outcome of the discussion of the relevant work in IS is summarised in Table 1.1.

Relationship between IS and empowerment	View of empowerment	Unit of analysis	Role of technology	IS researchers
IS can cause decentralisation	Decentralisation of decision making	Organisation	Technological determinism	Wyner & Malone (1996); Malone (1997)
New IT strategy & IT architecture is needed for empowerment	Empowerment as a necessity for the modern enterprise	Organisation/ individual	Application/ infrastructure architecture supports empowerment	Hoffman (1994)
IT can lead to empowerment	Greater user power in their relations with management	Individual users	PCs have empowering potential	Clement (1990)
Computerisation as an occasion for users to gain more control	Strengthening of users' role and contribution to the organisation	Individual users	Technological change serves as a catalyst for organisational realignment	Clement (1994)
Introduction of IS complemented by empowerment	Transformation of hierarchy; team empowerment	Individual employees	Technological change serves as a catalyst for organisational realignment	Wareham et al. (1997a&b)
IS use to bypass the hierarchy	Limited & unclear; empowerment within the hierarchy	Individual employees	"Electronic communications have the potential to empower people through increased info and access"	Sayer & Harvey (1997)

Table 1.1: Summary of research directly addressing IS and empowerment

The literature review clearly suggests that there is no single, unequivocal relationship between IS and empowerment, whether this relationship is approached on the level of structure or action, from a technologically deterministic perspective or not. IS can be employed to support employees by providing information or promoting the delegation of decisions, while at the same time IS can be used to control and monitor employees. Hence a 'dichotomy', or rather a continuum, appears between the 'positive' and 'negative' support that IS can provide for empowerment. This continuum, we believe, is at the core of the issue and needs to be further explored. It is clear from the literature that the issues relating to IS in empowerment are rather more social and contextual, than technological. In a sense, these are all examples of the two sides of the same coin, what Walton calls "dual potentialities of IT" (Walton 1989). By that he refers to the "capability of the

same primary technology to produce one set of organisational effects or its opposite" (Walton 1989, p.26) and he summarises the principle effects of IT in a table which ranges from what he terms 'compliance' to 'commitment' (see Table 1.2). IT can be a powerful force for either goal or anything in-between, depending on how the organisation chooses to use it.

Compliance effects	Commitment effects
Monitor and control	Disperse power and information and promote self-supervision
Routinise and pace	Provide discretion and promote innovation
Depersonalise	Enrich human communication
Dispossess individuals of their knowledge	Raise skill requirements and promote learning
Decrease dependence on individual	Increase importance of individual skill and internal motivation

Table 1.2: Dual organisational potentialities of IT (source: Walton 1989, p.27).

These ideas are echoed by many other IS researchers:

"There is often more than one way to computerize some segment of social life. The "same equipment" can have different social consequences when the associated social arrangements are substantially different" (Kling 1991, p. 358).

Zuboff (1988) similarly, despite her technologically deterministic views on the liberating, informating potential of IT, acknowledges that the impact that IT will have depends on the strategy that the organisation chooses to adopt and is therefore again a matter of social choice.

Empirical evidence has also often shown that the same system can have different effects on the work organisation it is meant to support (George and King 1991; Joshi 1990; Williams 1994).

Thus it appears that the systems themselves are not the critical issue, but rather the social conditions in which they are built and used. The way a particular system will support empowerment or not, will probably depend on the particular organisation and its objectives, rather than be unequivocally brought about by a single system.

"The dual potentialities of advanced information technologies afford managements the opportunity to make choices about the type of organisational influence they want from the IT systems they approve" (Walton 1989, p.26).

IS will not always empower employees but can act as tools depending on the specific organisational conditions. The manufacturing context, organisational tradition, culture, structure and roles, issues like the nature of tasks, skills and internal processes and procedures (Legge, Clegg et al. 1991; Walton 1989), seem to be important mediating variables in the choices that need to be made about empowerment and information systems.

1.4 Reframing the research problem

1.4.1 Refining the research question

A further point that merits clarification here is that, as in some cases, IS can be supportive for empowerment, can we regard them as able to empower employees? The ubiquitous yet unquestionable reference to the relationship between empowerment and IS (particularly in the popular IS literature) and the discussion of IT's "empowering potential" (see Section 1.3.2) seem to suggest so. Pfeffer (1994) notes that sharing information is a necessary precondition to empowerment but does not go any further in qualifying this claim. Similar views are frequent:

> "Management information from customers and processes helps companies achieve these imperatives [responsiveness and flexibility] by empowering employees to solve problems and to improve constantly the output of customer-focused processes. Companies need **information designed to empower employees** to think and act decisively, using their own expertise and experience. Empowerment in this context means simply giving people "bottom-up" problem-solving information and asking them to continuously improve the output of processes" (Johnson 1992, p.10, emphasis added).

Although this definition of empowerment is obviously extremely limited, the interesting point is that it is almost equated to the provision of information. In this sense, Johnson (1992) believes that the right and appropriate type of information can indeed empower employees.

With a view of empowerment as essentially the decentralisation of decision making authority to lower level employees, and the recognition of the criticality

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of organisational choice in IS impacts, our position is that the mere use of IS - no matter how sophisticated - will not enhance employee autonomy and self-management. A different view is rather highly dangerous as it does not recognise the complex, political nature of the approach. Empowerment is usually a highly political organisational choice, that is introduced essentially due to senior management and in conjunction with management initiatives such as BPR and TQM (see Chapter 4). Thus the empowerment of employees demands much more than the use of modern technologies.

Therefore we refute the technologically deterministic views of the role of IS in empowerment and rather focus on the support that IS can provide if they are regarded as a tool. Our research question can then be formulated as: **what is the role of IS in support of empowerment in manufacturing organisations?**

In particular we wish to focus on the use of IS by individual employees and teams, assuming that the organisational desire for empowerment is there. As employees assume broader tasks and responsibilities to make decisions, solve problems and improve operations, the support that IS can provide appears potentially important. The new ideal has been depicted as:

> "[t]echnology that actually helps workers make decisions, in organisations that encourage them to do so" (Hammonds 1994, p.45).

Another point of interest that emerges from the literature, is that a great deal of attention has focused on the study of new technologies and systems that are introduced or developed in an organisation (see e.g. Allen and Scott Morton 1994; Applegate 1994; Scott Morton 1991; Venkatraman 1994). The majority of papers in information systems focus on 'new' technologies and their 'great' potential. This is undoubtedly brought about by the influence of technological determinism which sees IS and IT as the independent variable and the organisation, users and so on as the dependent variables (Huber 1990; Swanson 1987). The technological imperative model although criticised by many IS researchers as inadequate is still dictating the topics of enquiry and research questions in most contemporary work. As a departure from this

and in an attempt to explore the issue from a perspective that is perhaps more in line with the concerns and priorities of manufacturing organisations, **the research question focuses on what existing information systems can do in support of empowerment.**

As is frequently the case in the literature, organisational changes and restructuring are complemented or accompanied by the introduction of new technology and systems. However we have to envisage the situation that organisations cannot always afford to replace their systems or introduce new technologies in response to organisational changes and have to 'make do' with the existing ones. This is probably more the case in empowerment, since its relationship with IS is still unclear and uncharted, and therefore the justification of expensive investments in new systems based on requirements created by empowerment is likely to be difficult.

It is unclear whether the existing information architectures (in terms of existing systems, the technology itself, and all the procedures and operations they involve; information systems development, implementation, management and so on) of organisations are appropriate for supporting empowerment. In other words, is the existing information architecture sufficiently flexible to change from one of heavy flows of information and data up (and to a lesser extent, down) the organisational hierarchy to one where much information flows between the relatively low-level empowered decision makers? Apart from the author's own efforts (Psoinos & Smithson 1996; Psoinos and Smithson (forthcoming); Smithson and Psoinos 1997) there has been - to the best of our knowledge - no attempt to address this research question.

1.4.2 Potential role of IS in support of empowerment

Therefore, as there is extremely limited research to directly address our research question, we have to refer to the literature in general. In this section the findings from both the IS and management literature are organised in an original classification scheme describing the major support functions that we expect IS to hold for empowerment. Our analysis reveals that some evidence

suggests that IS can indeed support employees in their responsibilities, while additional evidence suggests that this support is fraught with difficulties. Nevertheless the proposed taxonomy is valuable in spelling out in detail the dimensions of IS support and in serving as a conceptual map for the conduct of empirical research.

Task and decision support

Firstly, IS can indirectly support empowerment by automating simple, yet time-consuming tasks such as routine administrative and operational transaction processing: still one of the dominant uses of IT in manufacturing organisations (Legge, Clegg et al. 1991). IS have been implemented to facilitate transactions such as order entry, inventory control, invoicing and dispatch, booking-in of completed operations, work-in-progress, and so on. Instead of having to follow time-consuming manual procedures, employees now engage in automated operations which hopefully are more effective and allow them more time to "think" about potential improvements and solutions to problems. Typically, 'empowered' employees still have their traditional workload alongside their new responsibilities, and thus automation contributes to lightening their overall workload, which is likely to be considerable.

Secondly on a more direct level, IS can support employees in decision making which seems to be - along with control of operations and processes - one of the most important underlying reasons for IT use in the manufacturing industry (Culpan 1995).

"Each worker - line, staff, executive - not only needs information to perform her own tasks, but she also needs information to organise and control her work, and to monitor and control the resources at her command. In addition, each worker needs information about the effects of her activities on the larger groups of which she is a part: her work team, her department, the company as a whole and the community" (Hoffman 1994, p.112).

Employees need information about costs, quality, performance, operational efficiency and scrap rates, they need information about everything that they have to control, manage and decide upon (Zellner 1994). This type of "operational information" is provided to enable staff decision making and problem solving. As their tasks however, are enriched with other elements

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such as scheduling and long-term planning, IT facilities such as scenario planning, project planning applications, simulation programmes and so on, can have a positive impact on their success (Young 1989). IS can also provide support through decision support tools and facilitate team collaboration and group decision making (Poole and DeSanctis 1990).

However it is unclear whether existing information systems in manufacturing organisations are able to fulfil these requirements. IS in manufacturing have become almost synonymous with management information systems (MIS) and are widely seen as tools to support managers in their functions (Crescenzi and Gulden 1983; Keen and Scott Morton 1978). The MIS paradigm is based on the organisational control view of information systems (Swanson 1991), which invokes rational management action and centralised control of organisation. Traditional IS gather data from operations and channel information to the higher levels of the hierarchy (bottom - up information flow) (Bedworth and Bailey 1987). Employees are usually provided with access to as little information as possible. But even if access is broadened it is questionable whether the existing systems contain the necessary information at the right level of detail and relevance (Hoffman 1994). The decision making needs of staff are likely to be very much operational, as opposed to tactical or strategic. Furthermore although the decisions are the same (though someone else, e.g. a supervisor, was taking them) the decision maker is different, which is likely to entail:

- different conceptual models and technological frames (Orlikowski and Gash 1994);
- different decision making processes; and
- weaker understanding of the effects of his/her activities and decisions

Recent research on IS and decision making suggests that existing IS have focused on traditional models of decision making such as planned decision making or bounded rationality and sequential stages, and failed to incorporate aspects such as improvisation (Ciborra 1996b), or interpretative sense-making based on previous experience (Langley, Mintzberg et al. 1995). Langley,

Mintzberg et al. (1995) criticise the fundamental assumptions that have guided most work on organisational decision making and the mechanisms that support it: these are

"that organisational decisions are identifiable outcomes of impersonal and isolable processes" (Langley, Mintzberg et al. 1995, p.261).

Boland, Tenkasi et al. (1994) raise an important criticism that assumes particular relevance in relation to lower-level employees as decision makers. They argue that decision makers spend much of their time trying to "make sense" of complex situations, characterised by uncertainty and ambiguity. Rather than information systems being treated as pipelines that carry data to straightforward rational decision makers, Boland et al. (1994) would prefer to see IS providing support for the interpretative sense-making function.

Finally, as noted above, the information that IS provide could promote an understanding of the various interdependencies between tasks, teams and processes (both internal and external) which employees do not usually possess in large, complex organisations (Kling, Kraemer et al. 1992). Information systems can also help them understand the effects of their decisions on both upstream and downstream operations (Young 1989). This however requires integrated systems where employees could see "across" functions and such systems are not in place in many organisations (Hoffman 1994).

Teamwork

As empowerment usually identifies the team as the basic work unit of an organisation, information technologies that focus on the group such as Computer-Supported Cooperative Work (CSCW) (Ciborra 1996a), have been found particularly relevant to fulfilling the promise of IT as a means to support employee empowerment. One such groupware product is Lotus Notes, which is an integrated working environment that supports communication, coordination and collaboration through features like electronic mail, computer conferencing, shared databases and customised views (Lloyd and Whitehead 1996; Orlikowski 1992b; Orlikowski 1996b). Empowered teams may perform

many different tasks, with members changing jobs periodically (Wellins, Byham et al. 1991). IS can facilitate such flexibility, without losing control and consistency, by acting as a repository of information and experience (e.g. discussion databases) and as a collaboration and communication mechanism between teams and shifts. Orlikowski (1992b) however, notes that in competitive and individualistic organisational cultures where there might be few incentives or norms for cooperating or sharing expertise, groupware on its own is unlikely to engender collaboration.

Furthermore, the main focus in this research has been on communication aspects rather than on the application of groupware in decentralised decision making situations (see e.g. the investigation of cc:Mail use in Sayer and Harvey 1997), while Group Decision Support Systems (GDSS) which could be of value in team decisions, seem too elaborate and complex to be used in everyday team meetings. Also their effectiveness remains questionable (DeSanctis and Poole 1994; Poole and DeSanctis 1990).

Communication and coordination support

Information systems can assist in facilitating internal and external communication (Pacanowsky 1988), and in creating the appropriate "open" culture through electronic mail, video-conferencing and other similar facilities. Electronic mail is probably the groupware application that has seen the widest success. Emerging technologies such as computer and video conferencing and e-mail, have also been quoted as facilitating coordination among dispersed teams (Olson, Card et al. 1993). On the other hand, research has suggested that the organisational bureaucracy and institutionalised social practices can inhibit their effective use (Markus 1994; Perin 1991).

"Electronic social fields in particular are ambiguous and unpredictable forces susceptible to managerial suspicion and negativism" (Perin 1991, p.77).

Empowerment creates extensive communication requirements not only vertically (for control purposes), but also horizontally between and even within empowered teams as it cannot be assumed that all team members work together in the same time and space. Information systems can provide the link

that connects the individuals and teams with the organisation in general, but also provide the horizontal link that can interconnect the various teams that are working in parallel (Kling, Kraemer et al. 1992). This coordination element is particularly crucial in manufacturing where activities are tightly interrelated and processes are usually very sensitive to variations (Duimering, Safayeni et al. 1993; Shani, Grant et al. 1992). Furthermore it assumes particular importance in empowerment as:

> "widespread independent initiatives [...] may cripple the organisation by disrupting coordination. Excessive differentiation and loose coupling can attenuate communication patterns, producing duplication of efforts, random, entropic patterns, lack of follow-up, and little shared meaning for threats and competition in the marketplace" (Albrecht 1988, p.386).

Kling, Kraemer et al. (1992) studied the support that IS can provide to manufacturing coordination through economic and sociological perspectives and point to the importance of social as well as technical obstacles to the vision of seamless integration. Social issues arise as IS tie together organisational members and groups that are likely to have different objectives, cultures and work practices. These difficulties are likely to be accentuated in an empowering organisation where increased decentralisation and responsibility could lead to a more "individualistic" culture.

General provision of information

Through IS, the empowering organisation can widely distribute information that is needed to build the trust of employees in management. IS can keep staff fully informed of the company's performance results (sales, profits) and competitors' performance, and the company's plans and goals (Lawler, Albers Mohrman et al. 1992). IS can also contribute in stimulating employee interest and involvement.

> "A key to achieving this kind of involvement has been maintaining a complete, consistent and accurate flow of information about our business, from monthly performance indicators to ongoing strategies" (Rothstein 1995, p.29).

Finally, staff participation in planning and setting direction is impossible without information (Lawler, Albers Mohrman et al. 1992).

In many organisations, employees have received little encouragement or information to help them build up a 'a big picture' of the organisation's market position and future prospects. In diffusing such information, IS managers may have to deal with the reluctance of some user managers to share their information. Unfortunately, at the moment it appears that very few organisations have understood and accepted the importance of the provision of information to staff (Lawler, Albers Mohrman et al. 1992). This seems to be mainly due to the reluctance of management to give up their "privilege" of being the sole "owner" of information, as the "information equals power" metaphor has prevailed (Bloomfield and Coombs 1992). The need-to-know concept is still seen as the principle on which the provision of information is designed. Access to information is strictly based on functional and hierarchical role even though research has suggested that a clear correlation between functional role and particular information needs cannot be asserted (White 1986). Information needs seem to be based more on immediate problem-solving than on some notion of set functional roles and responsibilities (White 1986).

Performance measurement and control

The conventional idea and function of performance monitoring is that employees' activities and outputs are continually monitored by superiors who control their subordinates. In empowerment, employees take on responsibilities for monitoring and control of their own day-to-day functions.

"Workers need to know the direct results of their own work: quantity of output, quality of output, and measures of mistakes and waste" (Hoffman 1994, p.117).

For these purposes, the provision of accurate, complete and timely information as well as the communication support that IS can provide are essential. They can supply work teams with exactly the right type and amount of feedback to enable them to learn to improve the processes for which they are responsible. This is a concept particularly common in total quality management (TQM) where IS can provide valuable feedback on quality matters that can be analysed to locate problems and their sources (Jurison 1994).

While IS can support these activities, which would be useful for self-managing teams, the same systems can provide an apparently objective record of performance, and are likely to be perceived as "surveillance" mechanisms that limit employee discretion and autonomy (Bloomfield and Coombs 1992; Sewell and Wilkinson 1992). Recent research on computer-based monitoring, the practice of collecting performance information on employees through the computers they use, suggests though that its effects on workers are not uniformly negative (George 1996).

Another quite different dimension in which IS have been noted to constrain empowerment, is through traditional accounting information systems (Johnson 1992). Johnson (1992) claims that the use of accounting-based performance measures, drives employees to manipulate processes and their outputs in order to achieve accounting targets. The accounting information systems that are built around these measures to control business operations tend to reinforce a top-down imposed control that forces employees to work towards goals that they cannot relate to. Furthermore most traditional accounting information systems are likely to constrain empowerment by focusing attention on immediate cost and revenue concerns which severely limit the flexibility of employees and departments.

This original taxonomy describes the potential roles that IS can play in relation to empowerment; it suggests that a strong link exists between the two, but also that organisational conditions are critical in how IS will support employees. These ideas are further explored in the next chapter.

1.5 Structure of the thesis

This chapter has introduced the ideas behind this research effort and tracked the development of the research questions through a careful review of the literature on empowerment and IS. The first contribution of this chapter is the review of the literature based on a classification that distinguishes between work that studies the impact of IT and IS on structure, and work that focuses on individual agents, thus emphasising the two interlinked dimensions of

empowerment. Furthermore our review highlights another critical factor in the study of IS and empowerment: the differences between technologically deterministic accounts of IS effects on empowerment and perspectives that approach IS as enabling rather than causing empowerment. The third contribution is the original taxonomy describing the potential role of IS in empowerment which is a useful tool for the analysis of IS support in empowering organisations.

The outline of the chapters of the thesis is as follows: Chapter 2 presents the theoretical background that was used to inform this research. A rather broad conceptual framework was drawn up initially based on the ideas presented in Chapter 1. This was used to guide the initial stages of data collection. A second more sophisticated model was developed as the research was progressing. This was inspired by the structurational model of technology proposed by Orlikowski and Robey (1991) and Orlikowski (1992a), and was extensively based on Giddens' original structuration theory.

Chapter 3 presents and justifies the research methodology that was followed, starting from a discussion of the philosophical assumptions behind our approach, which is essentially founded on the interpretive paradigm. An argument for a combination of qualitative and quantitative research methods is put forward and supported by our empirical work. Chapter 3 concludes with the presentation of the specific research design that was followed. This commenced with a quantitative survey of UK manufacturing organisations, which was complemented by a series of 20 in-depth interviews. Two case studies of organisations selected from the series of interviews form the main part of the empirical research and the techniques that were used in all three stages are detailed in the chapter.

Chapter 4 presents the findings from the survey and the 20 in-depth interviews and the first stage of our analysis of the relationship between empowerment and IS. The findings confirm that empowerment is indeed pursued by many manufacturing organisations within their various efforts at improving their organisation of work. The research participants view IS as an

important enabling tool for empowerment but clearly note that the role of IS in this is supportive rather than initiating; IS do not lead to employees becoming empowered. The interviews revealed that manufacturing organisations are facing a wide range of problems and constraining aspects with their existing IS, and in the last section of the Chapter, these concerns were analysed in relation to the support of individual employees.

Since many of these constraints are related to organisational and broader social factors, a more in-depth study of each particular organisational context was necessary. This was achieved in two case studies which are presented and analysed in Chapters 5 and 6. The case analysis was facilitated by the conceptual model developed in Chapter 2. The cases reveal that the problems that arise with IS support for empowerment have to do with interactions between agents and IS largely reproducing the traditional structural properties of the organisation. These are still mostly constraining empowerment and are difficult to change. Nevertheless in both cases, some instances were noted where the interaction between agents and IS transformed, rather than reproduced these properties.

The themes of reproduction and transformation are subsequently examined in more detail in Chapter 7 which presents an analysis of the role of IS in transforming organisational structure. The analysis helps to draw out an improved perspective on IS and organisational change which holds interesting implications for both IS theory and IS practice. The thesis concludes with Chapter 8 where the contribution and the limitations of the research are delineated and some suggestions for further research are put forward.

CHAPTER TWO

A THEORETICAL FRAMEWORK FOR THE ANALYSIS OF THE ROLE OF INFORMATION SYSTEMS IN EMPOWERMENT

This chapter presents and discusses the theoretical foundation of this study and tracks the development of a conceptual framework that serves as a guide for the empirical investigation and the analysis and interpretation of the research findings. From the literature review presented in the previous chapter, a core argument is articulated and expressed in the form of a conceptual framework. This was used to guide the early stages of the empirical research. However it soon became evident that it could not provide descriptions and explanations of the necessary detail. The structurational model of technology proposed by Orlikowski appeared valuable for the analysis of the role of information systems in relation to empowerment, but since her work is only one application of structuration theory, it was deemed necessary to study the writings of Anthony Giddens. Thus the second main section below presents in some detail the main elements of structuration

theory. A review of other applications of structuration theory in the information systems field presented in the following section helps to further clarify these elements. These ideas are brought together in the form of a theoretical framework for the analysis of the role of IS in empowerment (which is a development of our initial conceptual framework).

2.1 A conceptual framework of the role of IS in empowerment

The literature review presented in Chapter 1 suggests that although our research questions focus on the support that IS can provide to individual agents, the organisational properties that determine how these IS are built and used are also of particular importance. Hence in the study of IS support for empowerment it is not sufficient to examine the individual employee and his/her enlarged roles and responsibilities as the main unit of analysis, but one also needs to study the organisational level. However, as noted above, the encouragement of empowerment signifies some changes in these properties. Thus it becomes clear that the institutionalised features of the organisation are likely to be critical for the support that IS provide for the new work practices.

For our analysis we can start by saying that empowerment essentially signifies some changes in the people element of the organisation, since the main thrust in most empowering organisations - as we discussed in Chapter 1 - focuses on changing employees' attitudes, roles and responsibilities. If an organisation is viewed as a system composed of four main elements, structure, tasks, technology and people then a change in one element is likely to echo through the system to cause changes in other elements. According to Leavitt's "diamond" conception of organisations which is essentially such a view of organisations, people (actors) are closely interrelated with the other three variables that make up the organisational system: structure, technology and tasks (Leavitt 1965). These four are highly interdependent, so that change in any one usually results in compensatory (or retaliatory) change in others. Therefore, a change in people - whether it concerns their numbers, roles, responsibilities, skills, attitudes or activities - will probably bring about a

change in certain tasks, a change in structure and a change in technology (it is here where IT comes into play)[1]. In this conception we can add the element of organisational culture which we believe is not adequately addressed by the 'people' element (see Figure 2.1).
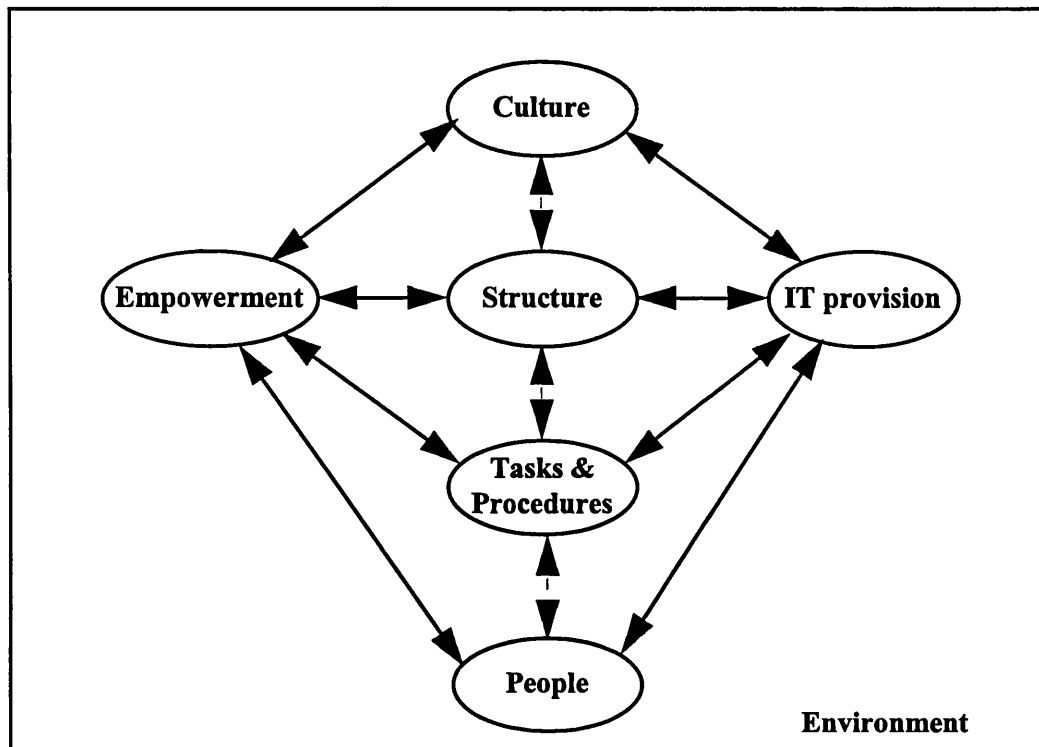
Figure 2.1: Conceptual framework of IS in empowerment (source: author).

Thus the encouragement of employee empowerment is likely to bring about other changes if the organisational system is to remain stable. However, not only is empowerment likely to affect culture, structure, people and tasks but it will also be affected by them. Empowerment is not an "independent" variable; apart from environmental factors - such as external competitive pressures, industry conditions, market instability - that might encourage an organisation to adopt the empowerment philosophy, the four organisational elements are likely to be critical for the form it takes and for its outcome (Conger and Kanungo 1988; Foster-Fishman and Keys 1997). For example, a tall hierarchy can act as a constraint to the empowerment of employees, whereas a

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[1] This conception, only slightly modified, was also employed in the MIT90s research project (Scott Morton 1991), while the same organisational characteristics are also used by Knights and Murray (1994) in their model (see Chapter 2, p.41-42).

supportive management attitude could facilitate empowerment. The tasks that the organisation as a whole has to perform in order to achieve its goals and also the tasks on an individual level, are likely to influence the outcome of empowerment.

By IT provision in Figure 2.1, we are referring to the information systems and the IT department. The IT department can be seen in most cases as the main provider and manager of IS, and its actions and direction are likely to be critical in the way IS are employed within empowerment (Angell and Smithson 1991).

However, the IS of an organisation are largely dependent on these four organisational characteristics (Swanson 1987) as they are built in order to support them. The importance of organisational culture (Schein 1984) for IS has been often pointed out (Avison and Myers 1995; Davies 1990; Walsham 1993b). Markus and Pfeffer (1983) have argued that unless IS design and implementation efforts address what they call the structural features of organisations, involving power distributions and cultures, they will not be successful (Markus and Pfeffer 1983). Similarly Willcocks and Mark (1989) point to the need for actions aimed at producing a supportive culture for the introduction and operation of IT. Although organisational culture as a concept tends to appear frequently in IS research, it seems often left undefined despite disagreement and confusion on its meaning (Avison and Myers 1995). In our analysis culture is understood to refer to sets of shared values and beliefs which are themselves articulated by participants-in-the-culture in the form of shared meanings and understandings of organisationally significant phenomena;

"a set of beliefs, widely shared, about how people should behave at work and a set of values about what tasks and goals are important" (Brown and Starkey 1994, p.808).

It is a powerful dimension and should be considered carefully when discussing the role that IS can play in an organisation, and more specifically in our case, in an empowering organisation.

The need for compatibility between an organisation's design (its structure and processes) and the design of its technologically supported information systems has been discussed in the literature since the early days of MIS adoption. The classic article by Ackoff (1967) was probably the first to pinpoint the need to develop MIS that fitted an organisation's design, followed by other articles that address the same issue (Huber and McDaniel 1986; King and Clelland 1975; Markus 1984; Raymond, Pare et al. 1995). As discussed in Chapter 1, we are justified in pointing to the importance of organisational structure for the successful use of IS.

Tasks and procedures have also been identified as an important determinant of an organisation's use of IS (Galbraith 1977; White 1986). Characteristics such as task uncertainty, complexity and variety have been found likely to increase the necessity of IS use in an organisation (Swanson 1987), and therefore we suggest that they could have a strong influence on the role of IS in empowerment. By tasks and procedures we mean the "work" that the organisation has to do in order to achieve its goals, and the way it goes about doing it. Therefore, by this characteristic we are referring to the product, the core technology that the organisation employs, and the related elements.

Finally, the environment comes into play as a mediating factor in the role of IS in empowerment. Issues such as environmental complexity (Pfeffer and Leblebici 1977), instability and an organisation's assumptions regarding its environment (Lawrence and Lorsch 1967) have been identified as determinants of an organisation's IS use (Swanson 1987), and can be expected to be critical also in the role that IS play in the empowered organisation.

Thus IS are developed or introduced into a manufacturing organisation in order to support its processes and are built taking into account the specific requirements but also the broader organisational context where they will be subsequently implemented (Applegate 1994). Considerable research in IS implementation has shown that many IS failures are due to IS being developed and implemented without the necessary consideration of some

organisational characteristic (Walton 1989). Hence, changes in the main organisational characteristics are likely to lead to a "mismatch" between the organisation and its IS, where the latter might not support the new organisational situation that the empowerment ideas promote. The difficulties are essentially due to the fact that although some organisational elements might change, these changes cannot be instantly reflected in the IS of the organisation. IS are in general, not very responsive and flexible to the changing requirements of their users (Avison and Fitzgerald 1988; Avison, Powell et al. 1994) and it can be found that although work practices might change, IS are unable to adapt. Therefore, the support that the existing IS of an empowering organisation can provide to employees may well be inadequate. We argue that the organisational characteristics that were prevalent before the encouragement of empowerment which are embedded in the IS and also strongly determine the way they are used, may serve as significant constraints to the effective use of the technology in the new situation. Hence IS are likely to pose barriers to or facilitate the activities of empowered employees, depending on the organisational characteristics that are embedded in the systems and/or determine the way they are used.

On the other hand, we also need to point out that the four organisational elements should not be considered constant and static but highly dependent on environmental circumstances (Lawrence and Lorsch 1967). For example, a take-over of the organisation by another company might entail changes in the organisation's culture which are likely to influence the empowerment outcome. Similarly, the introduction of a major new technology is likely to hold implications for the tasks in an organisation, which in turn might affect empowerment. Furthermore, there exist strong relationships between the four main organisational variables. Apart from Leavitt who stressed their interdependencies in his "diamond" model, there is significant evidence that supports the relationships between culture, structure, people and tasks and procedures (Lawrence and Lorsch 1967).

The above model characteristics are not all likely to be equivalent in strength. In the context of empowerment, we expect organisational culture and people

to be the most crucial elements and those that define the form that empowerment ultimately takes. If the culture of an organisation is very different from the one that empowerment usually creates, then empowerment will be significantly constrained. Alternatively, the appropriate type of culture would mean that the structure could change more easily, and that it would give flexibility for the tasks and people skills to change as well. On the other hand, regarding the mediating role that these variables play in the role that IS can have in relation to empowerment, we anticipate that the way the tasks and the organisation structure have been embedded into the existing IS could constrain their usefulness in empowerment.

Although this conceptual framework emphasises the importance of the organisational properties in the role that IS can play in an empowering organisation and points to the widespread implications of empowerment, it fails to identify any critical constraints in the effective use of IS in empowerment. Moreover it is unable to suggest a path for identifying them, since the organisational elements are in far too generic a form to guide empirical investigation and analysis. Thus, further conceptual development was needed in order for the framework to guide the collection - and especially the analysis - of empirical data.

2.2 Structuration theory

The recognition that the institutionalised features of an organisation are likely to be critical in the support that existing IS could provide for employees for their new work responsibilities, resulted in the study of the IS literature addressing the interaction between IS and organisations. In this area the work of Orlikowski (1992a) was noted as particularly valuable. Her work is an application of concepts from the theory of structuration in the study of technology and more specifically IS. These concepts appeared as being capable of illuminating our research questions and therefore the original tenets of structuration theory were studied, in order to provide an analytic framework. Writers in information systems which is a field that frequently employs concepts from other disciplines, have warned against the study of

theories from their application. The danger of relying on the interpretations of secondary sources or of other writers has been critically pointed out recently by Jones (1997) who exemplifies his claims with an interpretation of structuration theory in the IS field: the manner in which Gopal, Bostrom et al. (1992) took up the adaptive structuration theory of Poole and DeSanctis (1989),

> "without any reference to the original source of the concepts they are employing, as the basis for a positivist research programme that is almost the polar opposite of Giddens' position" (Jones 1997, p.108).

Structuration theory helps to avoid certain pitfalls which have characterised much research on IS: on the one hand it avoids the determinism and reification of IT as it is depicted in objectivist theories, while on the other it recognises that organisational properties become institutionalised in time and thus stretch beyond individuals' actions (Orlikowski and Robey 1991). Structuration theory also emphasises that structural properties are created and recreated through human action, a conception which is central to the view of information systems as social systems (Walsham 1993a). Furthermore, structuration theory has one distinct advantage in relation to other contextualist approaches (e.g. Checkland 1985; Kling 1987; Kling and Scacchi 1982; Pettigrew 1985, 1987, 1990): its focus on human agents enables explanations of the conditions which come into play in the various situations. Contextualist approaches highlight the factors that shape IS practices, but cannot explain why these factors are potent. For example, Pettigrew (1985) emphasises the importance of norms in organisations, but cannot explain how a particular norm came about. Structuration theory enables the grounding of abstract organisational factors and conditions into agents' motivations and actions.

In this particular research effort, structuration theory appears powerful in explaining the reproduction of institutionalised properties which mediate the support that IS can provide to employees in empowering organisations. Furthermore, our research questions operate on two levels of analysis: the work practices of employees that involve IS and the social structure of the institution in which these practices take place. Structuration theory is

concerned with how social practices are responsible for the production and reproduction of social structure and are themselves shaped by this structure. It attempts to provide an inherent balance between agents and social systems which reflects the dichotomy of individual employee - organisation which is also at the core of empowerment. As noted in Chapter 1, the notion of empowerment is closely dependent on the individual human agent assuming responsibility for his own actions, and yet, in the organisation studies literature, it is treated more as a structural phenomenon. As the duality of agency and structure is the main premise of structuration theory it seems highly appropriate for this investigation.

2.2.1 Introduction

The theory of structuration is a set of concepts that have resulted from a systematic attempt to think through and resolve certain theoretical problems that have been extensively discussed in the social sciences. One is the question regarding the relation between the social sciences and the natural sciences, and whether the natural sciences should be taken as a methodological basis for the study of social practice. A second persistent problem is the relation between individual and society: whether society or social structure is prior to the individual and dominates him/her, or whether the social sciences must take into account and not disregard the meaningful actions of individual agents. Giddens has analysed these problems and has put forward a coherent theoretical framework which draws on a range of ideas and lessons stemming from this analysis (Giddens 1976; Giddens 1979; Giddens 1984). His extensive writings have been characterised as "one of the most important bodies of work in contemporary social theory" (Held and Thompson 1989, p.1).

Structuration theory is an attempt to move beyond the opposition between structural sociology and perspectives that emphasise human capability. Giddens proclaims that this dualism has to be reconceptualised as a duality, what he terms "the duality of structure". He is among many other social scientists who believe that social sciences should consider the structural

features of social contexts in conjunction with the meaningful actions of individual agents. In order to escape this dualism, we need to:

> "analyse social structure so that we can clearly discern how it *requires* agency, and analyse human agency in such a manner that we grasp how all social action *involves* social structure" (Bernstein 1989, p.25).

This question is essentially addressed by the premise of the duality of structure:

> "by the *duality of structure*, I mean that social structures are both constituted *by* human agency, and yet at the same time are the very *medium* of this constitution" (Giddens 1976, p.121).

2.2.2 Outline of the theory of structuration

This section presents an exposition of the main elements of the theory of structuration, drawing heavily on three publications (Giddens 1976, 1979 & 1984).

The Agent, Agency

Rejecting the tendency of structuralist schools of thought to regard human behaviour as the result of 'outside' forces that agents can neither control nor comprehend, Giddens places significant emphasis on the active, reflexive character of human conduct. He notes that human agents or actors - as he calls them interchangeably - have the capacity to understand what they do while they do it. This is an inherent and inseparable part of their actions and therefore their reflexive capacities are continually involved with the flow of everyday conduct in the contexts of social activities.

It has frequently been assumed that human agency can be defined only in terms of intentions. Giddens maintains that such a view confuses the designation of agency with the giving of act-descriptions. Agency according to Giddens refers not to the intentions people have in doing things **but to their capability of doing** those things in the first place. An act is intentional when the perpetrator knows or believes that the act will have a particular quality or outcome and where such knowledge is utilised by the author of the act to achieve this quality or outcome. Individuals are knowledgeable agents that are continually monitoring their actions; still there will always be conditions of

action that agents are not aware of, as well as unintended consequences of action. Giddens presents the interrelations among the above notions in what he calls the 'stratification model of action' (Figure 2.2):
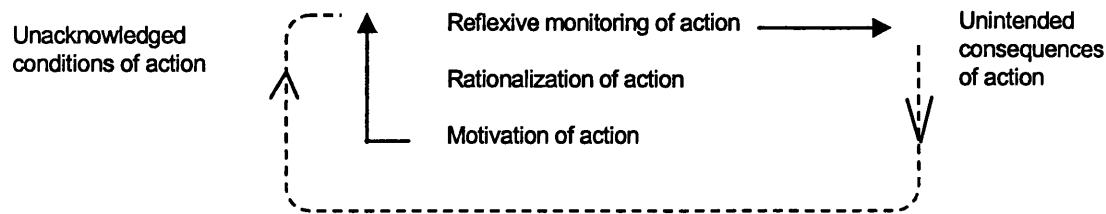
Figure 2.2: The stratification model of action (source: Giddens 1984, p.5).

Day-to-day life occurs as a flow of intentional action, but many acts have unintended consequences, and these may systematically feed back to be the unacknowledged conditions of further acts. Unintentional doings can be conceptually distinguished from unintended consequences of doings.

"The consequences of what actors do, intentionally or unintentionally, are events which would not have happened if that actor had acted differently, but which are not within the scope of the agent's power to have brought about (regardless of what the agent's intentions were)" (Giddens 1984, p.11).

So here Giddens is essentially saying that the consequences of one's actions are beyond one's control. This demonstrates the limitations of any attempt to analyse action just by focusing on the individual agent. The agent's 'command' of the situation is bounded both by unintended consequences of action and by unacknowledged conditions of action.

Giddens distinguishes between practical and discursive consciousness, placing emphasis on practical consciousness, for humans in many cases possess a deeper understanding of what they are doing and why, which they cannot express in words.

Finally the concept of the routinisation of social activities is closely related to practical consciousness. The routine is whatever is done habitually and forms a basic element of day-to-day social activity. The repetitiveness of activities

which are undertaken in a similar way everyday, is the basis of the recursive nature of social life. The essentially given character of the physical "milieux" of daily life accentuates routine and is deeply responsible for institutional reproduction. The concept of routinisation is very powerful in explaining the 'fixity' of much social conduct and the resulting stability of organisations. It also assumes particular significance in the context of manufacturing establishments and their traditional ways of working.

Agency and power

For Giddens:

> "to be an agent is to be able to deploy (chronically, in the flow of daily life) a range of causal powers, including that of influencing those deployed by others. Action depends upon the capability of the individual to "make a difference" to a pre-existing state of affairs or course of events" (Giddens 1984, p.14).

Therefore action is closely related to power in the sense of transformative capacity. Resources are the media through which power is exercised; this use of power does not characterise any specific type of conduct but is a routine element of social conduct.

Structure, Structuration

Structuration theory differentiates between the concepts of system and structure. System is the patterning of social relations in time-space which involves the reproduction of situated practices, while structure involves:

> "the structuring properties allowing the "binding" of time-space in social systems, the properties that allow discernibly similar social practices to exist across varying spans of time and space and which lend them "systemic" form" (Giddens 1984, p.17).

Social systems, which are essentially reproduced social practices, do not have structures, but rather exhibit structural properties. Thus *the structural properties of social systems are their institutionalised features* which lend them solidity and substance through time and space.

Giddens notes that the term 'structure' tends to be used when one wishes to describe the more enduring aspects of social systems. In structuration theory, structure is understood as rules and resources recursively implicated in social reproduction. Structure is seen as two aspects of rules - normative elements

and codes of signification - and two aspects of resources. Authoritative resources derive from the need to coordinate the activities of human agents, while allocative resources stem from the control of material products or of aspects of the material world. In this sense structural properties express forms of domination and power. The rules of social life can be regarded as techniques or generalisable procedures applied in the enactment and reproduction of social practices. The awareness of such rules is at the core of the knowledgeability of human actors.

The Duality of Structure

Structure(s)	System(s)	Structuration
Rules and resources, or sets of transformation relations, organised as properties of social systems	Reproduced relations between actors or collectivities, organised as regular social practices	Conditions governing the continuity or transmutation of structures, and therefore the reproduction of social systems

Table 2.1: The main elements of the duality of structure (source: Giddens 1984, p.25).

The duality of structure emphasises that *the structural properties of social systems are both medium and outcome of the practices they recursively organise.* The knowledge that agents possess regarding what they do in everyday life is created by the existence of structure. Human agents make use of this knowledge, in order to make their interaction meaningful. There is no other way for agents to understand each other and what each does. Thus the very possibility of the mutual understanding and coherence of situated interaction depends on the existence of a set of structural properties in a social system.

Human social activities are recursive; they are not brought into being by social actors but they are continually recreated by them through the means which they use to express themselves as actors. *In and through their social activities actors reproduce the conditions that make these activities possible.* Social systems consist of the reproduction of situated activities of human agents (see Table 2.1). The structuration of social systems refers to:

"the modes in which such systems, grounded in the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts, are produced and reproduced in interaction" (Giddens 1984, p.25).

In drawing upon the structural properties this way, agents contribute to reproducing them. Furthermore, by reproducing them, they also reproduce their 'facticity' as a source of structural constraint: agents treat the structure of their social system as 'real' and it becomes 'real' and concrete because they, and other agents in similar and connected contexts, accept it as such. Nevertheless, despite its 'facticity', structure should not be regarded as external to individuals. The structured properties can stretch away from the control of any individual actors, while there is also a possibility that the theories of actors regarding the social systems which they help to constitute and reconstitute in their activities may reify those systems.

Although most forms of structural sociology have proclaimed the idea that structural properties of society hold constraining influences over human action, in structuration theory they are seen as always both enabling and constraining, as they enable agents to act but also delimit the possible courses of action based on rules and the availability of resources. Structuration theory maintains that structure does not simply restrict an agent's freedom of action but is closely implicated in it.

Forms of Institution

In trying to illuminate how the day-to-day interaction of agents relates to the structural properties of social systems, Giddens introduces the notion of modalities. The modalities of structuration:

> "serve to clarify the main dimensions of the duality of structure in interaction, relating the knowledgeable capacities of agents to structural features. Actors draw upon the modalities of structuration in the reproduction of systems of interaction, by the same token reconstituting their structural properties" (Giddens 1984, p.28).

The modalities of structuration stem essentially from the conceptualisation of structure as rules and resources. Giddens notes that rules have two aspects to them: they relate to modes of signification or meaning constitution and to the sanctioning of social conduct. But rules cannot be conceptualised separately from resources. In this way Giddens distinguishes three analytic dimensions of structural properties: signification, domination and legitimation. The first is essentially related to meaning, the second to relative power

positions among social agents and the third to norms that covertly guide social behaviour and action. Human action on the other hand involves the constitution and communication of meaning, power asymmetries and the application of normative sanctions (Giddens 1979).

The constitution and communication of meaning is achieved by interpretative schemes. These are standardised elements of shared stocks of knowledge that allow agents to achieve meaningful communication. Actors sustain an understanding of what they say and do by integrating 'what went on before' and 'what is expected to come next' into the present of an action. Meaning has two senses in structuration theory:

> "what an actor means to say/do, and what the meaning of his utterance/act is" (Giddens 1979, p.85).

The normative character of social life is based on rights and obligations. Whenever the symmetry between rights and obligations is factually broken in social conduct, sanctions may be applied to sustain and reproduce norms. Norms are the rules, values and conventions governing appropriate conduct and their application results in normative sanctions. The operation of sanctions however does not only exist when actors overtly try to bring each other 'into line', but it is rather a chronic feature of all social encounters. It is also strongly implicated in the production of meaning since conformity to linguistic rules has an 'obligating' quality. Normative sanctions can also be seen as a generic type of resource drawn upon in power relations (Giddens 1979).

Power can be related to both structure and action: in one sense it is involved in institutional processes of interaction as domination, and also it is used to accomplish outcomes in strategic conduct as transformative capacity. This view of power has been heavily criticised (Callinicos 1985; Cohen 1989). In the duality of structure power is instantiated in action and is exercised through the activation of resources which reproduce the structures of domination; power itself is not a resource. Giddens submits that in his theory he employs the term 'power' to refer to:

"interaction where transformative capacity is harnessed to actors' attempts to get others to comply with their wants. Power, in this relational sense, concerns the capability of actors to secure outcomes where the realisation of these outcomes depends upon the agency of others" (Giddens 1979, p.93).

This capability is achieved through the mobilisation of facilities which can be allocative and authoritative. Structures of domination refer to asymmetries of resources employed in systems of interaction.

Giddens stresses that these dimensions can only be examined in isolation from reflexive human action, in so far as we acknowledge the analytic nature of the process, and not that it exists so in real life. He also points out that these modalities are deeply and inextricably connected, and in real-life situations the communication of meaning cannot be separated from the exercise of power or the application of sanctions. Figure 2.3 depicts the dimensions of structure and how these are linked to human action through the modalities of structuration.
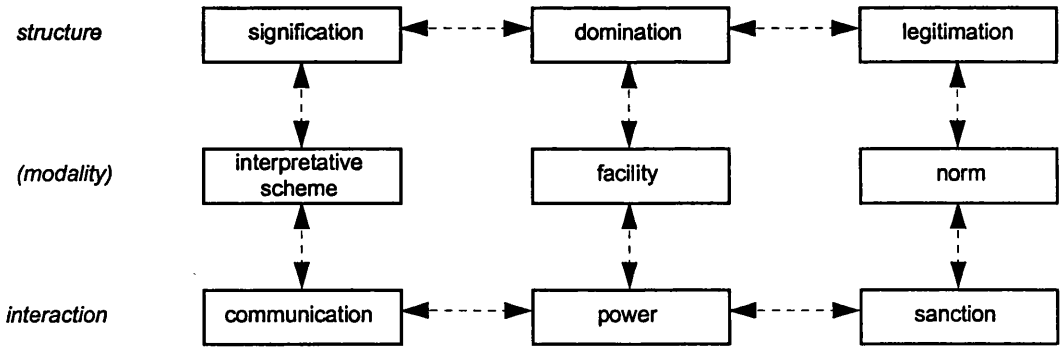
Figure 2.3: The dimensions of the duality of structure (source: Giddens 1984, p.29).

Therefore the three modalities are the means through which agents organise their social processes, but equally they are the media for the reproduction of the structural properties of social systems. Human actors draw upon the interpretative schemes that stem from the structures of signification that characterise their social system in order to make sense of their world and the actions of other agents as well as their own. They are guided by the norms of the social system in assessing the actions of other agents and their own, and they mobilise the facilities that are available to them in order to achieve

desired outcomes. Simultaneously though, when an agent utilises the facilities that are available to him, he sustains the asymmetry of resources that is characteristic of all social systems and in this way reaffirms the existing structures of domination. Similarly, moral judgments reproduce the structures of legitimation on which they are based and communication via certain interpretative schemes reinforces the particular world view of a social group.

2.2.3 Critique of structuration theory

As any theoretical construction, structuration theory cannot contain the "whole truth" and has received considerable criticism (Bryant and Jary 1997; Callinicos 1985; Clark, Modgil et al. 1990; Cohen 1989; Held and Thompson 1989). A full examination of these criticisms is beyond the scope of this thesis, but the points that are of value in informing our own application of the theory are briefly noted. A number of critics have argued that although structuration theory proclaims the tight coupling between action and structure, it still treats them as analytically distinct (Callinicos 1985; Cohen 1989). They maintain that since human agency is deeply affected by social structure, they cannot be analysed as two separate and distinct elements. A similar criticism was voiced by Archer (1982) who noted that by conceptualising action and structure as a duality, it is difficult to simultaneously regard human action as continually reproducing existing social structure on the one hand, and as having transformative capacity on the other (Archer 1982). We return to this issue in Chapter 7 based on our own experience.

Bauman (1989) criticises Giddens's emphasis on the individual actor which he claims has neglected the networks of interaction and interdependency in which actors are always embedded (Bauman 1989). We would indeed agree that Giddens does not examine how the activities of one group of agents can interact with those of another in reproducing the structural properties they recursively organise, but rather considers them in total isolation.

Giddens's proposal to conceive of structure in terms of rules and resources has also been the target of considerable criticism. Thompson (1989) argues

that this conceptualisation owes its problematic aspects to the ambiguities of the term 'rule', and to the fact that by wishing to formulate a general notion of structure, Giddens neglected the specific features of social structure (Thompson 1989).

Our main critique is that structuration theory barely touches upon the issue of change and how it comes about, but rather explores reproduction in great detail (this concern is analysed in more depth in Chapter 7).

Other criticisms concern the conflation of structure and agency (Willmott 1997), the difficulty in applying the theory in empirical research (Gregson 1989) and so on. Nevertheless, structuration theory has become so popular that is by now considered to express the mainstream views in social science (Willmott 1997). Its concepts have been broadly used to guide and inform research in a wide range of diverse fields, from geography (Jacobs 1997) to nursing (Paley 1998), accounting (Boland 1993; Dirsmith, Heian et al. 1997) and management (Macintosh and Scapens 1990). Indeed even in information systems we can discern numerous applications of structuration theory, particularly in the last decade.

2.3 A review of interpretations of structuration theory in information systems

This section presents the most often quoted applications of structuration theory in the IS field. Since Orlikowski's work led us to consider structuration theory, we describe her work first (Orlikowski and Robey 1991; Orlikowski 1992a). Through the analysis of these interpretations, we develop a better understanding of structuration theory and a basis for a conceptual framework.

2.3.1 The structurational model of technology

Orlikowski (Orlikowski and Robey 1991; Orlikowski 1992a) proposes a new theoretical model that provides a reconceptualisation of the role of technology in organisations, in order to overcome the limitations of both the deterministic

and overly voluntaristic perspectives. She bases her reconstruction on the notions of structuration theory as it provides a 'bridging' of the opposing subjective and objective views on organisations. Although Orlikowski acknowledges that Giddens does not address the issue of technology in his writings, she applies some of his main concepts in her study.

Orlikowski proposes that technology can be considered a structural property of organisations, as it embodies some of the rules and resources that constitute the structure of an organisation. In the spirit of structuration theory she puts forward two main premises of what she calls 'a structurational model of technology': the duality of technology and the interpretive flexibility of technology.

With the duality of technology Orlikowski recognises that although technology is physically built and socially constructed by human agents, it often tends to lose its constructed character. It tends to become reified and institutionalised, as agents habitually use it in the course of their everyday life. Indeed there are many advantages to be gained from the habitual, unreflexive, effortless use of technology, as we can observe in the use of the telephone and so many other essential technologies. Nevertheless Orlikowski rightly notes that there are situations where the continuous unreflexive use of a technology can be ineffective or even dangerous. Technology is always built and designed with certain operating conditions in mind and therefore users need to ensure that these operating assumptions do not differ greatly from the current conditions.

The interpretive flexibility of technology highlights the involvement of human agents in the physical and social constitution of technology during its development or use, and aims to challenge the 'black box' view that users frequently have of technology. The view of technology as a fixed object owes much to the time-space discontinuity of the processes of development and use. Often the design and development of the technology is separated in time and space from its use. Thus users receive the completed product and tend to treat it as a 'black box', whereas designers are far more aware of the

constructed nature of technology. This discontinuity - Orlikowski argues - is also responsible for the conceptual dualism dominating the literature: researchers studying the design and development of a technology tend to regard it as constructed, while researchers studying the deployment of a technology in the workplace tend to take it as a given, fixed external variable.

The structurational model attempts to overcome this dualism and proposes that technology can be affected by human action throughout its existence. Its main tenets are presented in Figure 2.4:
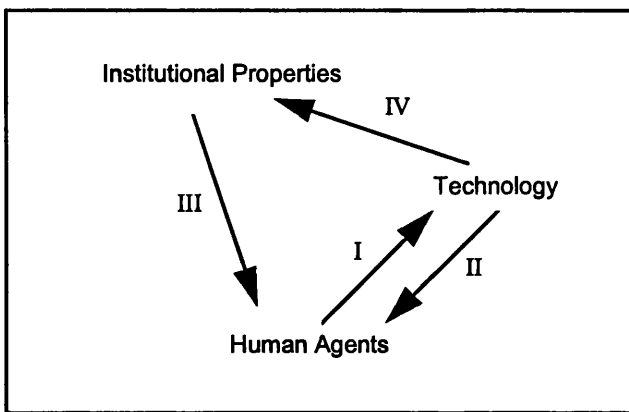
Arrow	Type of Influence	Nature of Influence
I	Technology as the product of human action	Technology is an outcome of human action such as design & development, appropriation and modification
II	Technology as the medium of human action	Technology facilitates and constrains human action through the provision of interpretive schemes, facilities and norms
III	Institutional conditions of interaction with technology	Institutional properties influence humans in their interaction with technology, e.g. intentions, design standards, professional norms, state of the art in materials and knowledge, and available resources
IV	Institutional consequences of interaction with technology	Interaction with technology influences institutional properties of an organisation, through reinforcing or transforming the structures of signification, domination and legitimation

Figure 2.4: Orlikowski's structurational model of technology (source: Orlikowski 1992a).

In the design mode - which is only distinguished from the use mode for analytical purposes - agents build into the technology certain interpretive schemes, facilities and norms which are appropriated by the users. Orlikowski claims that because technology has to be appropriated by users, they always maintain control in their interaction with it. Nevertheless, there might be other

factors that allow very little discretion to the users over when and how to use the technology; still these are not inherent in the technology, but are rather institutional factors. Technology mediates human activities and constrains and facilitates them at the same time, since by facilitating work in a particular manner, it constrains individuals in performing work in a different way. This dual influence means that technology has both restricting and enabling implications.

In order to illustrate the structurational model of technology, Orlikowski interprets the findings of a case study which investigated the use of Computer-Aided Software Engineering (CASE) technology, in a software consulting firm, Beta Corporation. She examines the development and use of CASE tools which were introduced to automate the systems development task and to assist the consultants. The initial development of the technology was fueled by the desire to increase productivity, diminish the company's dependence on the diverse technical knowledge required by their clients' different computer configurations, and standardise system development practices. In the production of the CASE tools, the technical consultants were influenced by the existing structures of signification and legitimation that were encoded in an already existing methodology, and the resources that were allocated to them by Beta's senior managers (structures of domination).

As the tools became mandatory on all large projects, they both constrained as well as facilitated development work. The tools saved time and simplified work by automating tedious and time-consuming manual design tasks, but at the same time they disciplined the way consultants work and imposed a specific, standardised and structured procedure. In order to save time from having to manually custom-design screens, consultants also promoted the tool-generated formats to clients as the only feasible product.

As a result, the tools influenced not only task execution and the final product, but they gradually affected Beta's structures of signification by providing schemes for reality construction through the knowledge regarding systems development embedded in them. The tools also contributed to Beta's

structures of domination by institutionalising a means of centralised control by making consultants use a standardised procedure and discouraging individual initiatives. Furthermore, the structures of legitimation were reinforced, as the tools promoted a set of norms that described what kind of work practices are desirable and acceptable.

While consultants largely embraced the use of the CASE tools in their everyday work, they served to reproduce and reinforce the existing structures of signification, domination and legitimation. When they perceived the tools as imposing a very rigid sequence on their tasks, they bypassed the procedure recommended by the tools; on one project, they covertly abandoned the use of the tools altogether. Eventually they managed to convince the project managers that the tools were too restrictive and modifications to the tools were carried out. Thus in this case, the consultants challenged Beta's structures of signification, domination and legitimation and with the new tools assumed more discretion in whether and how they use them. If the challenge is sufficiently sustained and diffuses throughout the firm, it may lead to a transformation of elements of Beta's structure.

Orlikowski's structurational model of technology is a valuable theoretical framework that has been widely quoted and applied in the IS literature (Brooks 1997; Han 1993; Monteiro and Hanseth 1996; Walsham 1993a). It is particularly pertinent to our study as it provides a way of linking IS with both individual use and organisational characteristics. It also illuminates the institutionalisation and reification of IS. As noted in Section 2.1, since we are concerned with the support that existing IS provide to employees that have assumed new tasks and responsibilities, IS are likely to be unable to 'match' the requirements for empowerment, as they were built and designed in a different institutional context.

The model, although very powerful and detailed in the description of the interaction between human agents and technology, appears relatively weaker on how this interaction affects organisational properties. Understandably Orlikowski tries to avoid the technologically deterministic accounts of

technology that have plagued the "impact of IT" literature (Ang and Pavri 1994; Attewell and Rule 1991; Wijnhoven and Wassenaar 1990). She argues that her objective is more a reconceptualisation of the notion of technology and less an examination of the relationship between technology and organisational characteristics, a topic that she develops in another paper (Orlikowski and Robey 1991). Nevertheless, since she does relate the interaction between human agents and the technology to the institutional properties of an organisation, we point to a few unclear points, particularly regarding organisational change.

Orlikowski notes:

"when users conform to the technology's embedded rules and resources, they unwittingly sustain the institutional structures in which the technology is deployed. When users **do not use the technology as it was intended**, they may undermine and sometimes transform the embedded rules and resources, and hence the institutional context and strategic objectives of the technology's creators, sponsors and implementors" (Orlikowski 1992a, p.412, emphasis added).

So the transformation in the rules and resources of the organisation can only happen if users do not use the technology as it was intended and modify their use of it. Now the extent to which employees modify their use of technology depends on whether they acknowledge its constructed nature. Interpretive flexibility is an indicator for the engagement that human agents have in the constitution of the technology. It implies that the more flexibly interpreted and used a technology is, the more agents will not use it as intended and the more agents can affect change. However, as Orlikowski repeatedly states, human agents appropriate the interpretive schemes, facilities and norms built into the technology in many different ways and through subtle processes. Thus the original intentions might be discerned only with difficulty. Furthermore, even the simplest technology - e.g. a hammer - can indeed be used in many ways that were not intended by the original creators of the technology. This is even more true for complex technologies like IT and IS; in these terms Orlikowski's account for the identification of conditions promoting the transformation of institutional properties seems inadequate.

Also by allowing for transformation of institutional properties only through unintended use of the technology, there seems no way that change can be brought about by the intentional introduction of a particular technology. This nevertheless has been demonstrated in many cases where the adoption of a technology was successful in affecting elements of the institutional properties of an organisation. Thus, we first question her definition of the mechanism for change, and secondly, how the resistance to the prescribed use of a technology results in the transformation of institutional properties. This point is also picked up by Walsham (1993a), who notes a lack of description of the dynamics of the process of change, and an inadequate specification of the linkage device between action and structure (Walsham 1993a; Walsham and Han 1991).

In support of our latter point we note the following: the broad examples she puts forward - describing users of complex technologies adopting manual "workarounds" - are unable to depict the link between the use of a technology in an unanticipated way and a change in the institutional context. The examples show change in operating routines and failure perhaps to achieve the expected benefits, but they do not show a transformation of rules and resources of the organisation (Orlikowski 1992a, p.412). In her example of the use of CASE tools in Beta, the modifications to the tools, do imply a change in the interaction between agents and the technology, but fail to be linked to changes in the established rules and resources (structure). The tools remained mandatory and the procedures they promote were likely to have persisted.

Therefore, does a modification in a technology and its use mean changes in institutionalised properties? As Orlikowski carefully calls it - 'the disruption' in Beta's institutional properties is more a result of human agents resisting an aspect of the technology; it can only lead to a transformation of the rules and resources if it persists - even with the modified tools - and spreads throughout the firm. Thus on the one hand she claims that the unanticipated use of technology can challenge institutional properties, while on the other she accepts that a change in technology use is not enough.

We believe that one reason for this confusion lies with Orlikowski's proposal to consider technology as a structural property. She initially suggests that:

"[...] technology embodies and hence is an instantiation of some of the rules and resources constituting the structure of an organisation" (Orlikowski 1992a, p.405),

while she later differentiates technology from the institutional properties of the organisation in her discussion of the structurational model. Indeed a change in one instantiation of rules and resources (modifications to the CASE tools) does not necessarily mean a change in the rules and resources themselves. Thus a modification of a technology does not always affect the structure of an organisation and therefore Orlikowski's attempt to link the use of a technology with a change in structure is problematic.

Walsham (1993a) agrees with this view and notes that it is confusing to regard technology as a structural property without placing emphasis on the difference between the physical and material aspects of the technology, and Giddens' view of social structures as memory traces in the human mind (Walsham 1993a).

In conclusion, we add a few comments related to the application of structuration theory. Firstly, although Orlikowski mentions unintended consequences and unacknowledged conditions of action in her initial discussion, she fails to incorporate them in her model, from which they are absent. Secondly, in the discussion of the modalities of structuration, she defines the structures of signification as the organisational rules that inform and define interaction. Signification in our view, reaches far beyond rules and refers to the constitution and communication of meaning and to the very understanding of the social world that enables humans to act (Giddens 1979). Orlikowski's interpretation of structuration theory is re-examined in Chapter 7 in light of our own findings.

2.3.2 Other applications of structuration theory in information systems

Barley's (1986) work examines the introduction of computer-tomography (CT) scanners in the radiology departments of two different hospitals in the USA.

Although we do acknowledge that a CT scanner is not an information system, at least in the sense that we have been using the term, we briefly discuss his application of structuration theory because it has been widely quoted by IS researchers (DeSanctis and Poole 1994; Han 1993; Orlikowski 1992a; Orlikowski and Robey 1991; Walsham 1993a; Walsham and Han 1991). Barley (1986) proposes an outline of a theory viewing technology as a trigger for different organisational structures which affects institutionalised roles and patterns of interaction. His sequential model of the structuring process attempts to describe how articulations between institution and action evolve over time. In order to capture these articulations he employs the concept of scripts, which are outlines of recurrent patterns of interaction that define the essence of actors' roles. Thus Barley argues that in order for technology to occasion the structuring of organisations it:

> "must first disturb or confirm ingrained patterns of action to reformulate or ratify scripts, which, in turn, delimit the organisation's institutional structure" (Barley 1986, p.84).

His case studies of two radiology departments where an identical CT scanner was introduced, led him to conclude that even identical technologies may occasion similar processes that still can create different scripts and therefore different organisational structures in different contexts. Even though the structuring processes in both departments followed the same pattern and roles changed in similar directions, one department became far more decentralised, as formal properties governing the scripts were different. Barley submits that his research shows that:

> "technologies do influence organisational structures in orderly ways, but their influence depends on the specific historical process in which they are embedded" (Barley 1986, p.107).

Since the case studies analysed, concerned a tightly closed system of interaction between two groups of agents with clear boundaries, and there was still significant mediation of the social process, one could question the added value of searching for regularities in studies of other organisations that are typically far more complex than the ones discussed. It does indeed appear as if, besides the demonstration that social processes mediate the impact of technology, Barley is not able to specify in more detail those mediating properties (a similar point is made by Walsham and Han 1991).

Despite being informed by structuration theory, Barley's model uses only a limited set of its concepts that are subsumed in his sequential model. His conception of the institutional realm as "realised structure", namely patterns of actual practice, and his analytic definition of formal organisation as the grammar of a set of scripts, in our view misrepresents Giddens' idea of structure as rules and resources, and significantly underplays the constraining notions of structure. Moreover, even though Barley attempts to link the distribution of expertise to centralisation and specialisation, we find that the changes in the 'role relations' and 'role structure' that he proposes, remain rather at the level of action without being linked to the broader institutional properties of the department.

Thus, in the one department, role relations were found to be less rigid and radiologists and technologists behaved as if each possessed valuable, complementary skills; in the other, technologists assumed more autonomy over their day-to-day work. These changes though seem to refer to individual activities, and we cannot see how they can be linked to structural properties stretching beyond agents' control and outside their immediate presence. Even the fact that technologists ended up making many more decisions than they would normally do, seems to stem from an understanding between technologists and radiologists that remains 'internal' to their interaction order.

The analysis focuses strictly on only two groups of agents and their interaction in a closed system, with very little mention of other elements of the department and its surrounding institution (hospital). Surely external factors and considerations come into play as the radiology department is not isolated from the rest of the institution; nevertheless the effects of the broader context are not examined.

Walsham and Han (1991) interpreted Barley's (1986) analysis in terms of action and structure and suggested how his links between the two could be seen in structuration theory. They present a categorisation of applications of structuration theory in IS research and identify three major areas of potential applications: operational studies, use as a meta-theory and use of specific

concepts. Firstly, they note that structuration theory is valuable in carrying out empirical studies of IS use, IS specification, design and development and IS evaluation due to its emphasis on the interlinked nature of action and structure.

Secondly, they maintain that structuration theory can be used as a meta-theory to locate, interpret and illuminate other approaches. They re-interpret and critically review two papers on IS from the perspective of structuration theory, claiming that the theory can illuminate work to date and suggest ways for further empirical analysis. Thirdly, individual concepts from structuration theory can be of value in informing analyses of IS topics. For example, the notions of structural contradiction and conflict can be employed in the study of resistance to IS.

Han (1993) incorporated concepts of structuration theory into a conceptual framework useful for the analysis of government information systems (Han 1993). He employs the principle of the duality of structure to conceptualise the relationship between the context and process of computerisation as a dialectical relationship in which the differential influences of contextual elements form the institutional grounds of computerisation activities. Therefore elements such as government IT policy and organisational policies constitute structures of signification, legitimation and domination which are the medium in decision processes. These decisions reproduce or transform these contextual elements over time.

"Structuration occurs when pertinent aspects of the broader context are drawn upon in implementing computerization and IT activities" (Han 1993, p.80).

On the other hand, computerisation experiences combined with external variables bring about changes in the context. The resulting framework attempts to integrate the social systems perspective, Kling's web model, Pettigrew's contextualism, mixed level theory and structuration theory, in our view unsuccessfully. Despite the fact that this theoretical eclecticism ('pick and mix') can be seriously criticised, regarding the point in question -

structuration theory - Han's application is useful and interesting, albeit relatively broad.

Orlikowski and Robey (1991) construct a theoretical framework based on structuration theory - which is the same as the one presented in Orlikowski (1992a) - and suggest how it can be used to guide empirical research in systems development and organisational consequences of IT use (Orlikowski and Robey 1991). Their focus in this framework is on IT, and how it is created, used, and institutionalised in organisations. Their definition of IT refers to:

> "the use of any computers (that is hardware and software) deployed within organisations to mediate work tasks. Our only qualification is that the computers are sufficiently general-purpose so as to be capable of modification through systems design and programming" (Orlikowski and Robey 1991, p.144).

They propose that IT is central in the process of structuration as IT is the social product of human action, while at the same time it is a set of rules and resources mediating human action. In this sense IT is paralleled to social structure; a parallel which reveals the dangers of such an arbitrary conceptualisation. As noted above, we are opposed to applying the principle of the duality of structure to IT or IS.

Furthermore, by replacing structure with IT in their conception, Orlikowski and Robey (1991) diminish the former's importance by addressing it as "specific structural and cultural contexts" (p.151). It is only after they examine the role of IT in structuration theory and analyse how IT impinges on the modalities of structuration, that they include a section on IT and contexts of use, where they place the technology in the social context that surrounds it.

Thus the structure of the social system in which the use and development of IT takes place, is marginalised and considered last, which we believe is a misrepresentation of Giddens' ideas. We fail to see how the consideration of

> "the social context and social processes **surrounding** the use of technology" (Orlikowski and Robey 1991, p.156, emphasis added),

captures and conveys the fact that structure is internal to human actions. Even the term 'surrounding' refers to aspects outside and beyond the use of the technology by individuals.

Despite the problematic conceptual aspects of the structurational model of information technology, the particular paper is quite valuable in understanding the relationship between IT and organisations. Indeed the authors suggest that their model highlights the following five dimensions in IT/IS research:

1. the development of IT and how it is shaped by the organisational contexts in which it takes place;
2. the process through which IT is deployed, objectified and institutionalised in organisations;
3. the intended and unintended consequences of the use of a specific IT;
4. the conditions under which human actors reinforce or rather transform the form and function of a specific IT which is already in use; and
5. the conditions under which human interactions that involve IT reproduce or undermine the traditional organisational properties.

These issues appear quite relevant to our research and are further elaborated in the theoretical framework presented in Section 2.4.

Walsham (1993a) employs the theory of structuration as an aid in conceptualising the linkage between context and process in social systems. He develops a theoretical framework based on the key features of Pettigrew's 'contextualist' analysis (Pettigrew 1985, 1987). He firstly proposes that the divide between functionalism and structuralism on the one hand and objectivism on the other can be broadly seen as a distinction between schools of thought that place emphasis on the context and process respectively. He then goes on to replace the agency/structure duality of structuration theory with the process/context notions.

We find that the term 'context' is too loose a concept to present the 'organizing' potentialities of structure or the conception of structure as rules and resources. Furthermore the notion of context appears somewhat 'outside'

the agent, whereas Giddens never ceases to emphasise that structure is not external to individuals, but rather exists only as traces of their memory and is manifested only when they draw upon it in social action. Our concerns are supported by Whittington's critique of Pettigrew's work (Whittington 1992)[2].

Walsham then proposes a theoretical view of computer-based information systems that regards them as embodying interpretative schemes, providing coordination and encapsulating norms. Thus he justifies his claim that they are:

> "deeply implicated in the modalities that link social action and structure, and are drawn on in interaction, thus reinforcing or changing social structures of signification, domination and legitimation" (Walsham 1993a, p.64).

Although we agree in principle with these ideas and employ them in our own conceptual framework, we would caution against such a view of information systems that fails to emphasise their constructed nature. Information systems do not embody interpretative schemes, facilities and norms on their own, nor can they reinforce or change social structures in organisations without human agency. Since human agency is a fundamental concept in structuration theory, we would rather maintain its prominence in any theoretical framework attempting to deal with IS in organisations.

In his discussion of the Processing company, Walsham presents the introduction of a new computer-based information system as a social process and describes the social context and its linkage to the process (Walsham 1993a). He provides some examples of the way social context influences social process, and then describes how social process either reinforces or changes contextual elements. A major point here is that this interpretation of the duality of structure confirms our concerns expressed previously regarding the equation of 'context' and 'structure'. The main elements of social context are identified as the social relations between participants, social infrastructure and the history of previous commitments. These might be a medium, but do not seem like *the product* and *the outcome* of human action; these elements appear too external to capture this fundamental notion of the duality of

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[2] Insights from Whittington's (1992) work are also drawn in Chapter 7.

structure. An argument that 'context' is a product of previous action that stretches across time and space can also be proved insufficient based on Giddens' clarifications:

"A structure can be described 'out of time', but its 'functioning' cannot. [...] The proper locus for the study of social reproduction is in the immediate process of the constituting of interaction" (Giddens 1976, p.120 and p.122).

Walsham traces the reproduction of the structures of domination, legitimation and signification from the initial choice of system to system development and the introduction of the new system in sales order processing. Before the implementation of the new system, agents involved in the process drew upon the existing structures and largely reproduced them. The problems that arose after the switch-over to the new system acted as a trigger for social action and change in the social structures.

"When the system was a major failure with respect to exactly the norms used to legitimate it, this provided the opportunity for various groups [...] to legitimate changed action on their part resulting in due course in transformed social structures, and attempts to initiate the development of new computer systems to encapsulate these revised structures in changed modalities" (Walsham 1993a, p.91).

His discussion provides a rich and coherent analysis of the structuring processes in the Processing company.

In a further application of structuration theory, adaptive structuration theory has been proposed as a way to study the role of advanced information technologies in organisational change (DeSanctis and Poole 1994; Poole and DeSanctis 1989; Poole and DeSanctis 1990). Adaptive structuration theory (AST) describes the type of structures that are provided by advanced information technologies and the structures that emerge in human action as people interact with these technologies. Despite our serious concerns over its unfaithful interpretation of structuration theory, we briefly review its main features since it has been used in numerous publications (Chin, Gopal et al. 1997; Gopal, Bostrom et al. 1992).

Different information technologies encourage different forms of social interaction. "As these structures are applied", DeSanctis and Poole (1994) suggest,

"their outputs become additional sources of structure. For example, after the group enters data into the GDSS, the information generated by the system becomes another source of social structures. In this sense, there are emergent sources of rules and resources upon which people can draw as social action unfolds" (DeSanctis and Poole 1994, p.128).

Focusing on decision-making processes, the authors continue to term structuration the act of bringing the rules and resources from an advanced IT or other structural source into action. This they claim can be deciphered by studying appropriations which are the immediate, visible actions that evidence deeper structuration processes. They propose that appropriation analysis which examines how technology and other sources of social structure are brought into human interaction through discourse can be undertaken to assess AST.

Overall we can say that AST concepts are valuable in illuminating the process of advanced IT use in group interactions, and appropriation can partly account for the fact that the same technology can be introduced in two groups and have inconsistent effects. However, their claims that their proposed medley of concepts is an advancement and a refinement on structuration theory are ill-founded, since firstly, they ignore the reciprocal interaction of human agents and structural properties of social systems. There is no feedback from the social process to the technology structures, simply an appropriation and selection of the technology features that agents use for their task.

Secondly, their approach appears to fall into the objective school of thought. AST only describes the *impact* that a specific advanced IT has on a social process such as group decision making. Thus their treatment is rather guided by technological determinism. Related to this is the unquestionable way they assume that technology brings about organisational change.

"When the technology structures become shared, enduring sets of cognitive scripts then the structural potential of the GDSS has brought about organisational change" (DeSanctis and Poole 1994, p.128).

GDSS are likely to reflect the assumptions and rules and resources already existing in the organisational context, since the systems are usually built in-house. If they are designed and developed outside the organisation in which

they are being used, it is more likely that the way they are ultimately used will be determined by the structural properties that are already prominent in the organisation (Orlikowski 1992a). DeSanctis and Poole fail to address this point and only acknowledge the existence of the structural properties of the organisation as the content and constraints of a given work task and as the organisational environment. These however are placed only secondary to the technology structures (see e.g. DeSanctis and Poole 1994, Table 3, p.129). AST has informed a new stream of positivistic research in GDSS (Chin, Gopal et al. 1997; Gopal, Bostrom et al. 1992; Sambamurthy and Chin 1994; Wheeler and Valacich 1996) which substantiates our concerns for its complete departure from structuration theory.

To conclude our review, we note the paper by Monteiro and Hanseth (1996) who discuss conceptualisations of the relationship between IT and organisational issues. They argue that in order to move beyond the frequently quoted "IT enables/constrains" position, we have to pay more attention to the specifics of the IS under investigation. They criticise the approaches presented by Orlikowski and Walsham as not describing in sufficient detail how and where the IT restricts and enables human action. They argue that it is not enough simply to suggest that IT and IS are a crucial factor in organisational transformations, but that it is necessary to suggest how exactly they relate to these.

After presenting a brief outline of structuration theory they proceed to suggest that actor-network theory (ANT) (Callon 1991; Latour 1987) can indeed be more successful in describing how specific elements and functions of an IS relate to organisational issues. They argue that their claim applies to being more specific about the technology. They propose that the notion of inscriptions is more concrete as it represents interests inscribed into a material. By this we think that they imply that such a notion could help pinpoint how specific features of IT/IS relate to organisational aspects.

The second strong point of actor-network theory according to Monteiro and Hanseth (1996) is that it treats technology in exactly the same way as human

actors, and removes the distinction between the two. It supports the view that in practice technical artifacts can play the same role as human actors. "The consequence of this", according to them,

"is that ANT supports an inquiry which traces the social process of negotiating, redefining and appropriating interests back and forth between an articulate, explicit form and a form where they are inscribed within a technical artifact" (Monteiro and Hanseth 1996, p.331).

We would be critical of the notion that technological artifacts should receive exactly the same status as human actors in explicating social processes. We fail to see how the authors of the paper can still claim to avoid technological determinism while proposing that an artifact can impose a specific social arrangement. Human agents are far more than an articulate, explicit form of their personal interests, while a technical artifact is frequently far less than an perfect inscription of people's interests.

To conclude our review we note the papers by Macintosh and Scapens (1990), Boland (1993), Scapens and Macintosh (1996) and Boland (1996). These advance a debate on the understanding of particular features of structuration theory and its application in management accounting research, and discuss the role of management accounting systems which could be seen as relevant to IS.

2.4 A framework for the study and analysis of the role of IS in empowerment

The concepts of structuration theory advance our understanding of how human action is structured in the routine activities of everyday life and how this action reproduces the structured features of everyday life. Structuration theory was deemed very appropriate in guiding this particular research because of the individual agent vs. structure dichotomy which is at the core of empowerment (see Chapter 1).

The other useful concept that was absent from our initial conceptualisation is the reproduction of structural properties through the interaction of human agents. Therefore it is not merely that IS are built and used based on the

structural properties that may constrain empowerment; in and through the activities that require interaction with IS, agents continually reproduce these properties. Furthermore, since empowerment implies changes in the institutionalised features of organisations, structuration theory helps us appreciate the complexity and difficulty of effecting such changes, but also points to ways and means of making them happen:

> "[t]he constitution of agents and structures are not two independently given sets of phenomena, but represent a duality" (Giddens 1984, p.25).

2.4.1 Interpreting the duality of structure

We can employ the concepts of structuration theory, primarily the relation between agency and structure to analyse the role of IS in relation to empowerment. By looking at manufacturing organisations as social systems, we can discern their structural properties and focus on the work practices of employees. As we are particularly interested in the role of IS in these practices, we can focus on the work activities that involve *an interaction between agents and information systems* (see Figure 2.5). Thus we can conceive IS practices such as IS design and development, IS use and IS management, as social processes at the level of action. This interaction should not be perceived similar to the notion of human - computer interface and does not necessarily occur on a one-to-one basis. With the use of the term 'interaction' between agents and IS we wish to capture the reciprocal influence between the two. IS practices can be linked to the structure of the organisation where they take place through the three modalities of structuration.

We propose to employ the conceptual model that is depicted in Figure 2.5 to portray the relationship between the interaction between agents and IS and *the structural properties* of an empowering organisation. In other words, we argue that the inadequacies in the support that IS provide to employees are due to the fact that the interaction between agents and IS produces and reproduces structural properties that are against empowerment. This study

will suggest how this happens and how it can be faced in order for information systems to provide better support for empowered employees.

We will employ the notions of structures of signification, domination and legitimation to capture the institutionalised features (structural properties, see Section 2.2.2) of manufacturing organisations. The *modalities of structuration* are the means through which situated interactions between employees and IS are linked to these structures. Figure 2.5 depicts an interpretation of the concept of the duality of structure in the organisational context. The modalities of structuration are depicted in the form of the thick arrows.
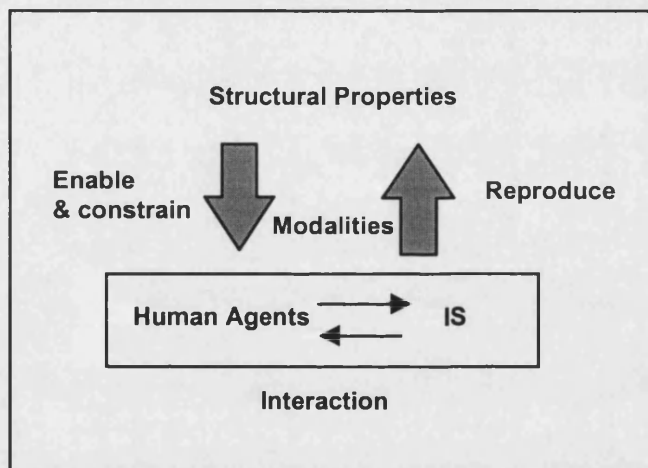
Figure 2.5: Conceptual model based on the duality of structure.

The activities relating to the design and development, use, appropriation and management of IS are a subset of the social activities that take place in the everyday operations of an organisation. In and through these activities employees *reproduce* the organisational conditions that make these activities possible. These conditions can be conceptualised as the structures of signification, domination and legitimation that are recursively implicated in organisational life. These structures that agents draw upon to produce and reproduce their activities are both *enabling and constraining*. They enable employees to act, but also delimit their possible actions.

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The enabling capacity can be seen in the following example: in order to make their interaction 'meaningful', agents make use of their knowledge of the organisational conditions in which they are involved. Common understanding and assumptions about the nature and function of the information systems in the organisation enable their effective use. These assumptions are vital, for without them interaction between agents and IS in activities involving IS design, development or use would not be possible.

Since these assumptions are based on the specific organisational conditions, the interaction between agents and IS contributes to reproducing them. Thus the structural properties should not be seen as merely 'mediating' the agents-IS interaction, for without them this interaction would not be possible in the first place. The structural properties however also constrain this interaction: due to the 'objective' existence of structural properties that the individual agent is unable to change, they place limits upon his/her range of options. Hence agents – whether IS designers, developers or users – cannot do 'whatever they feel like' in their interaction with IS; their actions are informed by the structural properties and are likely to have to 'comply' or stay in line with them. This is aggravated by the fact that in most large bureaucratic organisations, social life is characterised by reification, whereby individual actors confront the institutionalised features of their company as 'objectively given' (Archer 1982).

As the structures of signification, domination and legitimation of most manufacturing organisations are expected to be still rather traditional, they are likely to be against empowerment ideas. Since IS are built and used based on these structural properties which are also continually reproduced, the latter are likely to constrain IS support for employees.

Two qualifying notes need to be made to the above assumptions: firstly, should all the structures of signification, legitimation and domination in a company be conceptualised as against empowerment, or are there some structures that are supporting empowerment? Secondly, are their interpretations on the level of action homogeneous across the company, since

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organisations are not a 'single culture': the existence of subgroups within a broader social unit that maintain their distinctive character within the unit (Walsham 1993b), signifies multiple meanings and understandings of the same properties. Regarding this latter point, different subgroups within the organisation are indeed likely to perceive the structural properties in diverse ways (Howard and Geist 1995). Nevertheless, in relation to empowerment, we strongly believe that employees (who are the major subgroup we are interested in) in British manufacturing industry are knowledgeable and extremely skeptical about institutionalised features being favourable to their empowerment. Thus although they might have slightly different meanings for different employees, structural properties are unlikely to be perceived as promoting empowerment when in fact they are not. Therefore we can reasonably assume a shared understanding of the structural properties at least regarding the dimension this study is focusing on.

The first qualifying point stems from a weakness in structuration theory that affords a rigid coherence to structural properties (Archer 1982). Although we can reasonably assume that structural properties in manufacturing companies are mostly against empowerment, properties can also be changed and reconstituted (Bastien, McPhee et al. 1995). However:

> "the key point here is that during the time it takes to change something, then that thing continues to exert a constraint which cannot be assumed to be insignificant in its social consequences, whilst it lasts" (Archer 1982, p.462).

Hence even if it would be perhaps more accurate to visualise a combination of changing and more 'enduring' properties (some more and some less favourable to empowerment), the critical issue is that both sets would continue to exert a constraint on empowerment.

2.4.2 Conceptualising IS in structuration theory

How should information systems be conceptualised in structuration theory though? Although Orlikowski (1992a) employed the concepts of structuration theory to propose a reconceptualisation of technology, she does not refer to IS but rather to CASE technology. This term and the notion of technology that

she continuously employs reinforces the image of the "black box" as far as the IT is concerned; in her research she could have just as well been referring to any type of technology that mediates people's activities. The particular aspects and functions of the specific information technology are never analysed in any detail beyond referring to it as "the technology" or "the tools".

This criticism has also been expressed by Monteiro and Hanseth (1996) who note that the CASE tool that Orlikowski refers to, is:

> "never described despite the fact that such tools exhibit a substantial degree of diversity" (Monteiro and Hanseth 1996, p.329).

In order to better understand the link between IS and organisations they claim that we have to be specific about which aspects, modules or functions of an IS enable or constrain which organisational changes.

Orlikowski and Robey (1991) also, by-and-large, refer to information technology and only introduce the notion of information *systems* when they suggest how their theoretical model can be applied in research into the process of systems development and the social consequences of IS use. Thus although they do not provide any qualification on the matter, we can assume that for them the terms are interchangeable. Orlikowski and Robey claim that IT constitutes a central part in the structuration process. They justify this proposition as follows:

> "as much prior literature in information systems has shown, information technology provides a particularly interesting and possibly unprecedented opportunity for the redistribution of knowledge, resources and conventions in organisations, and hence for a shift in the relative capacities individuals have for strategic action. Given this potential, technology would seem to be an important ingredient within structuration theory" (Orlikowski and Robey 1991, p.150).

They propose that IT provides a set of interpretive schemes through its sets of concepts and symbols which users deploy to structure and understand their world. Thus they proclaim that IT is a medium for the construction of social reality. We feel that one needs to be cautious when assessing the mediating role of IT in representing reality, especially since human agents do not restrict their 'access' to reality to the one that IT allows them: as structuration theory points out, they are deeply knowledgeable and competent when it comes to

social interaction. Our concern is supported by research such as the one into technological frames, where different groups of agents although faced with the same technology, interpret it and understand it in different ways (Orlikowski and Gash 1994). If IT was but a lens "through which users come to structure and understand their world" (Orlikowski and Robey 1991, p.154), then everyone looking through the same lens would see the same thing. IT may provide *different* interpretive schemes, but cannot really replace human actors' stocks of knowledge. IT - they also claim - institutionalises interpretive schemes by formalising and encoding them which leads to their standardisation and common acceptance.

Relating IT and resources, Orlikowski & Robey (1991) point out that IT is the resource that enables agents with their information processing activities.

> "Thus the design and deployment of information technology, with its implications for information resources and enforcing rules, constitutes a system of domination" (Orlikowski and Robey 1991, p.155).

IT facilitates differential access to information and in this way helps institutionalise a structure of domination. On the other hand, IT reinforces already existing structures of domination by institutionalising the premises for decision making. Orlikowski and Robey (1991) note that research in IS typically shows that existing structures of domination are reinforced with the implementation of IT.

Finally regarding norms, Orlikowski and Robey (1991) claim that IT enables the formalisation and codification of norms, and therefore tends to control agents' behaviour, ensuring they act in conventional ways. Acknowledging though that in organisations there are many conflicting perceptions for what constitutes 'an acceptable, conventional way' of working, Orlikowski and Robey (1991) contend that IT will tend to reflect the goals and ideologies of the organisational group that built and deployed it.

> "In this way information technology can be seen to convey a set of norms that indicate the accepted actions, interests and practices in the workplace" (Orlikowski and Robey 1991, p.156).

Although we essentially agree with the core of their argument, we feel that their treatment of the link between the development and use of IT and the modalities of structuration fails to take into account the inherent characteristics of IT and IS, but rather seems to 'impose' the concepts of structuration theory on them. For apart from the potential redistribution of knowledge, resources and conventions, IS have been shown to have other capabilities that assume particular importance depending on the structural properties of the institution in which they operate (e.g. monitoring capabilities, automation, communication, to name but a few). We maintain that any attempt to study IS through the prism of structuration theory needs to appreciate the specific meaning and role they have in each organisation.

It is worthwhile to present Han's conceptualisation of IS-related practices (Han 1993). The development, implementation and use of IS is conceived as social action composed of the three modalities: its constitution as meanings, as a moral order and as the operation of power relations. The output of IS can provide users with a means for understanding the activities of their organisation which hence enables the meaningful communication among them. IS also store and disseminate information and thus are an authoritative resource that is used to control and coordinate agents' activities. Moreover, the development, implementation and use of IS reflect a set of values and beliefs that define legitimate and acceptable practices and the rights and obligations of actors. Han submits that:

> "the concepts, theories, rules, resources, values and ideals associated with information systems represent the structural properties that are produced and reproduced through the modalities in those social practices related to information systems development, implementation and use" (Han 1993, p.78).

Although we concur in general with his conceptualisation of IS we wish to point out a concern which stems from focusing too tightly on IS practices; the concepts and theories associated with IS are not the only properties that IS practices produce and reproduce. The latter contribute to the production and reproduction of the structure of the organisation in its entirety and not just to one of its subsets.

Hence, since IS are in most cases an inextricable part of organisational life, they seem deeply implicated in both the realms of action and structure, depending on the particular level of analysis. As their role and meaning though varies, in the study of specific manufacturing companies, a detailed assessment of the particular functions that IS serve in each case will have to be carried out (see Chapters 5 & 6).

2.4.3 The mechanisms of reproduction of institutionalised practices

In Orlikowski's application of structuration theory in the IS field (Orlikowski and Robey 1991; Orlikowski 1992a) the notion that technology both enables and constrains is a result of the conceptualisation of technology as a structural property. As noted in Section 2.3.1, we disagree with such a conceptualisation since particularly IT and IS cannot reasonably be pictured as an institutionalised feature of an organisation, stretching across time and space beyond the control of any individual actors (Giddens 1984). Even Orlikowski herself in another instance notes that:

> "in the case of information technology [...] users often continually shape and reshape applications, so that technology ceases to be a fixed, tangible constraint" (Orlikowski and Robey 1991, p.151).

Hence we would suggest that it is rather better to conceptualise the structural properties of the organisation, and the way they are embedded in the design of the technology and the way they control its use, that both enable and constrain work practices.

We also note the need for a more thorough analysis of the constraining aspects of structure in relation to the role of IS in empowerment. Structure is both enabling and constraining; it enables agents to act but it also determines what they can or cannot do. According to Giddens (1984) we can distinguish between three types of constraints: material, structural and (negative) sanction. For example, in the design and development of IS according to Figure 2.5, the designers are enabled by the structural properties of their organisation in their design activity, which does not have any meaning independent of them. The designer reads the organisation and the

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technology's intended users in order to decide what to design (Walsham 1993b). The designers invoke the structural order of their organisation in each of their activities and are guided by it: enabling a range of options for action, while at the same time placing limits upon this range. Apart from the constraining qualities of the structural properties that are due to their fixed and given character, designers have to face material constraints due to the material nature of information systems (hence the two-way arrows in Figure 2.5 between agents and IS).

When IS are used by employees to support them in the tasks and responsibilities brought about by empowerment, employees have to face the material constraints that are related to what the technological elements of the systems are able or unable to do, but also the structural constraints that were embedded in the IS during their design and development. Moreover, the interaction between employees and IS during the use of IS is both enabled and constrained by the structural properties which it continually reproduces. Thus the way IS can support employees in their new tasks and responsibilities can be constrained by the structures of legitimation, signification and domination that define how this interaction should take place.

Nevertheless we have to note that agents - either IS designers, developers, managers or users - are knowledgeable and reflexive in every interaction with IS. Thus structural constraints are not inescapable: their effects depend on the motives, reasons, knowledgeability and understanding that agents have for what they do and for the social system in which they operate (the notion of the interpretive flexibility of technology that Orlikowski (1992a) presents is an attempt to mediate the 'power' of structural constraints). If agents acknowledge the socially constructed nature of IS, they might try to deal especially with the structural constraints that limit the support that IS can provide in their work. Still there are always bounds to their knowledgeability which can be unacknowledged conditions of action and unintended consequences of action.

Another mediating factor here is the routinisation of social activities. Routine is fundamental for the individual for building a sense of trust in the social world and social activities, and for the institutions of society which exist only because of their continual reproduction. Routinisation creates an ontological security for agents in ordinary day-to-day social life and thus in their work environment, but it might also discourage challenges to the established and habitual modes of activity. Thus employees could be more likely to reproduce a particular work pattern no matter how problematic it is - in order to maintain stability and routine - than disrupt it and face the subsequent anxiety (Markus and Benjamin 1997).

Therefore our theoretical framework is built around the core theme of the production and reproduction of the structural properties of the organisation in and through the work activities of employees, focusing on those that involve an interaction between employees and IS. Human activities though do not only reproduce structural properties, but they might also reconstitute them, thus change them in some way or other (Dirsmith, Heian et al. 1997). Since structure is really 'internal' to actors' activities, the change in it can only come from them.

So how could the interaction between employees and IS transform aspects of the structural properties that constrain empowerment? Giddens points out that for an analysis of change one needs to understand the relations between reflexively monitored transformations and unintended consequences of action (Giddens 1989). One needs to examine the continuity and change in the reproduction of institutionalised practices. Reproduction circles also contain conditions of change which are partly reflexively organised. So what are those conditions that would encourage changes towards a better IS support for employees? There are many factors, Giddens says, that can influence processes of social change;

"but in empirical work [...] it is crucial to try to identify how unintended consequences interlace with the forms of knowledge which, both on practical and discursive levels, actors bring to bear upon the contexts of their behaviour" (Giddens 1989, p.299).

This issue is explored in depth in the case studies and re-examined in Chapter 7.

2.5 The role of structuration theory in empirical research

Before moving to the description of the empirical field work, it is we believe worthwhile to briefly clarify the role that the analytical framework based on structuration theory plays in this research study. Critics have noted that structuration theory is too abstract and broad, unable to direct attention to specific processes or aspects of social systems (Gregson 1989; Held and Thompson 1989; Thrift 1985). We find that the theory provides concepts that are indeed relevant to empirical research, but at the same time that it also:

> "warns against the pitfalls of some types of research procedure or interpretations of research results" (Giddens 1989, p.296).

It might not provide specific instructions for what a researcher should do, but it is not irrelevant to the execution and interpretation of research. Giddens urges researchers not to try to import the concepts he developed 'en bloc' into their research, but rather to employ the theory only in a selective way, regarding it as a sensitising device and not as a set of detailed guidelines for the execution of research.

> "As an operational principle of research, what structuration theory suggests is not that we should seek to categorize or classify the rules and resources involved in a given area of social conduct, but rather that we should place the emphasis squarely upon the constitution and reconstitution of social practices" (Giddens 1989, p.298).

The analysis of 'structure' according to structuration theory implies studying the subtle interrelations between social institutions and agents who have knowledge, albeit bounded, of how those institutions work. The essence of the use of theory to guide empirical research has we believe been captured in the following statement:

> "the concepts of structuration theory, as with any competing theoretical perspective, should for many research purposes be regarded as sensitizing devices, nothing more. That is to say, they may be useful for thinking about research problems and the interpretation of research results" (Giddens 1984, p.326-327).

It is in this light precisely that we propose to use structuration theory and the issues it highlights in this research study. The research does not aim to test or

apply the theory in an empirical setting, but rather use the theory to provide stronger descriptions and better understanding of the specific situation under study. These ideas lead us into the following chapter which examines in detail how this approach was dealt with in practice: the research methodology employed.

This chapter has tracked the development of the conceptual framework serving as the background to this research. The conceptual model which was developed at the outset of the research was employed to guide initial exploration and data collection. Through the empirical data collection process - as new ideas emerged and matured - the model based on structuration theory was developed as a more sophisticated version of the initial approach.

CHAPTER THREE

RESEARCH METHODOLOGY

The previous chapter identified the research problem and presented the development of a theoretical framework based on structuration theory that serves as a guide for the analysis of the role of information systems in empowerment. This chapter presents the methodology employed to conduct the empirical work which aims to explore how IS support employee empowerment in manufacturing organisations in practice. Since the purpose of the research is to investigate an existing situation taking place in contemporary organisations, the investigation needs to be conducted mainly through the empirical study of such settings. Furthermore, as this study is conducted by one person, it will undoubtedly be shaped by the view this person has about the social world and how we can explore it. Therefore the philosophical assumptions underpinning this research, play a critical role in how it is conducted and need to be spelt out clearly (Morgan 1983; Orlikowski and Baroudi 1991). Starting from these, this chapter outlines the research design and the specific techniques applied. The chapter justifies the

appropriateness of the methodology selected, and describes in detail the steps that were followed to demonstrate the consistency and reliability of the design in practice.

3.1. Methodological foundation

Although the implications of the adoption of a particular paradigm (defined as "the basic belief system or world view that guides the investigator" (Guba and Lincoln 1994, p.105) are seen as critical in the social sciences, it has been argued that in the IS field, researchers often fail to explicitly acknowledge their underlying paradigm (Orlikowski and Baroudi 1991; Preston 1991; Walsham 1995).

"What is required is that researchers understand the implications of their research perspective, and act in ways that reflect that knowledge.[...] they should understand and acknowledge the extent to which the perspective they adopt will focus their attention on some things and not others, and bias their perception of the phenomena under study" (Orlikowski and Baroudi 1991, p.24).

This section discusses the philosophical assumptions underpinning the research, and identifies the modes of analysis that were selected as the overarching theories for executing interpretive research.

3.1.1. Philosophical Assumptions - Interpretivist Paradigm

The choice of a research method is influenced by the inquirer's paradigm or worldview, which revolves around a set of assumptions concerning ontology, epistemology and human nature (Burrell and Morgan 1979; Guba and Lincoln 1994). Figure 3.1 depicts an overview of this, highlighting the paradigmatic debate between an objectivist and subjectivist view. Burrell and Morgan's (1979) central assumption concerning organisation studies, is that:

"all theories of organisation are based upon a philosophy of science and a theory of society" (Burrell & Morgan 1979, p.3).

```
        The subjectivist                The objectivist
        approach to                     approach to
        social science                  social science

    ┌──────────────┐                  ┌──────────────┐
    │  Nominalism  │◄──── Ontology ───►│   Realism    │
    └──────────────┘                  └──────────────┘

    ┌──────────────┐                  ┌──────────────┐
    │Anti-positivism│◄──Epistemology──►│  Positivism  │
    └──────────────┘                  └──────────────┘

    ┌──────────────┐                  ┌──────────────┐
    │ Voluntarism  │◄──Human Nature──►│ Determinism  │
    └──────────────┘                  └──────────────┘

    ┌──────────────┐                  ┌──────────────┐
    │ Ideographic  │◄──Methodology───►│  Nomothetic  │
    └──────────────┘                  └──────────────┘
```
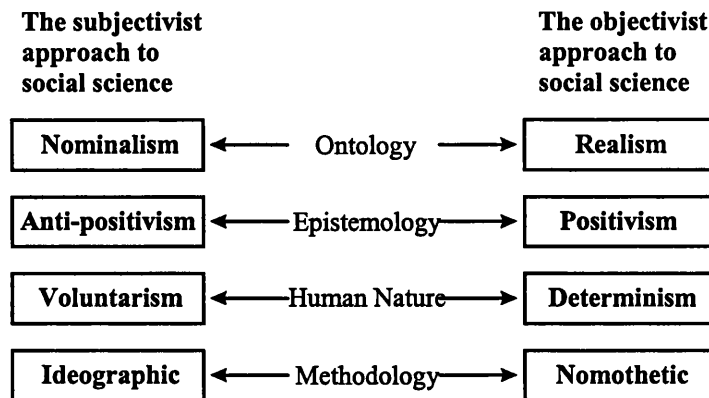
Figure 3.1: Scheme for analysing assumptions about the nature of social science (adapted from Burrell & Morgan 1979, p.3).

Accordingly, we place our philosophical assumptions in line with the subjectivist - interpretive paradigm. This implies a subjective epistemology (interviewer and subject create understanding) and the ontological belief, that reality is socially constructed. Interpretivism considers that our understanding and knowledge of reality are socially constructed (Walsham 1995). Knowledge evolves from human experience, which is inherently continuous and nonlogical, and may be symbolically representable, but is socially sustained and changed (Smircich 1983). According to Burrell and Morgan (1979) the individual's cognition is made up of symbolic 'names', 'concepts' and 'labels' which are used to make sense and structure external reality. In turn, the people, and the physical and social artifacts that they create, are fundamentally different from the physical and organised reality examined by natural science (Lee 1991).

In the interpretive tradition, organisations and information systems are therefore human constructs that are demarcated by social factors. Researching and observing such constructs requires interpretation of the empirical reality in terms of what it means to the observed subjects (Orlikowski and Baroudi 1991). Because the world of inter-subjectively created meanings has no counterpart in the objective reality of natural sciences, the methods of natural sciences are, at best, inadequate for social science and thus for research into information systems. Interpretive research opposes natural science research, because it presupposes that social and cultural life is

governed by laws external to the subject. Interpretivists attempt to understand human action by making sense of the meanings that underpin their actions. These are expressed in many symbolic ways and point to the fact that social reality is constructed as a result of intentional actions (Burrell and Morgan 1979). This requires a significantly deeper understanding of the social world, where reality is considered to be the product of the individual's cognition. These concepts form the ontological basis of this thesis, and move us away from the more commonly adopted 'objectivist-realist' paradigm.

Epistemologically, our research takes an anti-positivist stance (Guba and Lincoln 1994). It disregards the approaches propounded by the natural sciences as unable to explain and predict what happens in the social world. Contrastingly, in the search for regularities and patterns in the use of IS in organisations that are promoting empowerment, the intent is not to verify or falsify hypotheses but to increase understanding of the phenomenon within specific cultural and contextual situations and from the perspective of the participants (Orlikowski and Baroudi 1991). We seek to understand by engaging the frame of reference of the participant engrossed in action and life.

Assumptions surrounding human nature focus on the relationship between human beings and their environment. Two polarised models exist, determinism, which regards man and his activities as being completely determined by the situation or environment, or voluntarism, which considers man to be completely autonomous and free-willed (Burrell and Morgan 1979). Structuration theory addresses precisely this point and tries to bridge these two extremes: in and through their activities human agents produce and reproduce structure but at the same time structure enables and constrains these activities.

"Men produce society, but they do so as historically located actors, and not under conditions of their own choosing" (Giddens 1976, p.160).

In the context of our research which is the organisation, the relationship between human beings and their environment is formed by the subtle

interrelations between social institutions and agents who have knowledge albeit bounded of how these institutions work.

Undoubtedly interpretivism has limitations. Post-modernist researchers criticise interpretive research on the basis that no clear understanding can be ascertained by gauging a person's life experience (Guba and Lincoln 1994). It stands accused of less precision, rigour, or credibility compared to the positivist approach as it can be more open to distortion imposed by the values or purpose of the researcher (Hussey and Hussey 1997). Indeed, any research of this nature will always be filtered through the lenses of language, gender, social class, race, and ethnicity (Denzin and Lincoln 1994). Hence, there are no objective observations, only observations socially situated in the worlds of the observer and the observed. Similarly, individuals can seldom give full explanations of their actions or intentions - the limitations of what Giddens refers to as 'discursive consciousness' (Giddens 1984). In most situations, all they can offer are accounts, or stories, about what they did and why. In turn, some argue that no single method can grasp the subtle variations in ongoing experiences (Denzin and Lincoln 1994).

Nevertheless, based on our ontological, epistemological and human nature assumptions, we believe that interpretivism is the perspective that best accommodates the study of the support that IS provide to employees in relation to empowerment. This research aims to uncover the perceptions that employees and other organisational members have regarding information systems and their support to them. The notion of IS support cannot be assessed 'outside' the people who are receiving it or are closely involved in IS use. Furthermore since the particular use of IS under study takes place in a highly complex and continually changing social context affected by the adoption of empowerment, the research needs to be sensitive to the specific cultural and contextual organisational situations and study them in their natural settings. Interpretive research has a strong emphasis on contextualisation (Klein and Myers, forthcoming) and specifies the need for critical reflection on the social and historical background of the research setting. With an interpretive approach the data derived from the investigation

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are arguably characterised by a greater richness and allow us to take emerging factors into account, which were perhaps not foreseen at the outset of the research.

"The goal of interpretive field research is to improve our understanding of human thought and action through interpretation of human actions in their real-life context" (Myers 1997, p.242).

3.1.2. Mode of Analysis

There are a number of analytical approaches that broadly fall into the paradigm of interpretive research in the social sciences (Holstein and Gubrium 1994). Prominent approaches to understanding information systems and organisations are contextualism (Pettigrew 1985, 1990), ethnography (Bentley et al. 1992; Forrester 1992; Harvey and Myers 1995; Van Maanen 1979a), hermeneutics or phenomenology (Backhouse 1991; Boland & Day 1989; Lacity & Janson 1994; Lee 1994; Myers 1995; Sanders 1982) and soft systems methodology (Checkland 1985). Common to all these approaches is the concern for an in-depth understanding of the organisation in its social context and the role of information systems. All provide useful insights, such as Pettigrew's contextualism, which emphasises that research is a social process characterised by a language of muddling through, incrementalism, and a political process. It is concerned with the time analysis of three elements: the context, process and content of organisational change. Undoubtedly there are some drawbacks, such as the uncertainty characterising the distinction between outer and inner context, which should describe and lead to the unfolding of the process (Whittington 1992).

Other approaches, such as Checkland's soft systems methodology (SSM) philosophically view individuals and groups as continually constructing interpretations of the world as means of organisational intervention, but these interpretations have no absolute or universal status. The goal of SSM is the reconciliation of the differences in interpretations, and a common agreement in order to undertake action. Critics have argued that SSM does not take into account the constraining power relations likely to exist in organisations (Walsham 1993a). Ethnography on the other hand provides an

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anthropological approach to research that is likely to place the researcher in the midst of power relations. It involves a period of intimate study and residence in a well defined community, involving a wide range of observational techniques of both quantitative and qualitative nature (Van Maanen 1979a). This firsthand involvement provides detailed and explicit data, but the drawback can be the loss of the researcher's objectivity, the exposure to lies, ignorance and taken-for-granted assumptions by subjects and the danger of being overly descriptive in the analysis.

The interpretive research tradition in the social sciences historically has its intellectual origin in hermeneutics and phenomenology (Giddens 1976; Hughes 1990; Myers 1997) which have also been applied in IS research (Boland 1985; Boland 1991). Hermeneutics began as a science of interpretation of ancient or sacred scripts (Lacity and Janson 1994). Philosophically, hermeneutics is concerned with the interpretation and understanding of the output of the human mind which characterise the social and cultural world (Burrell and Morgan 1979). In the course of life, human beings are said to externalise their internal experience and knowledge through creation of cultural artifacts examples of which are institutions, works of art, literature, languages, religions and others. These objectifications of the human mind form the subject of study in hermeneutics.

The method used to study these is based on *verstehen,* on understanding the complex world of lived experience from the point of view of those who live it (Schwandt 1994). *Verstehen* therefore should be the means by which we comprehend the meaning of cultural artifacts, historical situations or social situations (Hughes 1990). In order to comprehend, the objective becomes one of re-enactment or reliving the subject's experiences in the subjective life of the observer. The use of hermeneutics today involves not only the analysis of texts and artifacts to discover meaning and significance, but also the reading of human behaviour, which is framed as 'text-analogues' (Lee 1991). To construct meaning from the parts of texts available, they have to be seen and understood in their holistic context. The analysis has thus to look at the evolving whole to understand the parts and vice versa. This process moves in

a circular iterative fashion towards an increased understanding of the objectifications of the subject - also referred to as the 'hermeneutic circle'. The drawback of hermeneutics is the danger of not being able to separate out 'external' information from what the researcher himself has contributed (Miles and Huberman 1994).

Phenomenology attempts to understand the meaning of objects as experienced by individuals in their *Lebenswelt*, i.e. lived-in world (Hintikka 1995). Husserl argued that human consciousness actively constitutes the objects of experience (Holstein and Gubrium 1994). Phenomenology focuses on making explicit the implicit structure and meaning of human experience as manifested in the consciousness - termed the ideal realities. The essence of consciousness can only be found if we 'bracket' all empirical particulars that relate to the 'lived-in' world (Giddens 1976). Phenomenological analysis assumes that there is a correlation between actual human experiences and the possible range of conduct. In turn, it takes the form of a methodological study of consciousness for the purpose of understanding the meaning of human experiences (Boland 1985). Consciousness, as the basis for analysis, has to be understood as awareness of what accounts for managerial excellence or a description of organisational myths, cultures, and symbols (Sanders 1982). The drawback of research aspiring to phenomenology is the difficulty of elucidating the 'essences', which may not transcend individuals and further lend themselves to multiple compelling interpretations (Miles and Huberman 1994).

Hermeneutics and phenomenology form the foundations of any attempt at an interpretative understanding of human action and are 'brought into' this research study through structuration theory. Giddens' ideas are solidly based on these philosophical schools of thought (see e.g. Chapter 1 in Giddens 1976). The contributions of these philosophies to the method of the social sciences are summarised by Giddens, and highlight the essential methodological directions that this study has tried to follow (Giddens 1976, p.155). Firstly, the social world, unlike the natural world has to be understood as a skilled accomplishment of active human agents. Therefore to understand

the particular segment of the social world we are interested in (i.e. a particular manufacturing organisation) we have to refer to the human agents that constitute it. Secondly, the constitution of this world as meaningful depends upon language and consequently the majority of data collected in this research are the agents' own words and particular attention was paid to report their exact words (see e.g. respondents' comments on questionnaire, Section 4.1.3 and, of course, interviews). Thirdly, the social scientist cannot but draw on the same skills "as those whose conduct he seeks to analyse in order to describe it" (Giddens 1976, p.155) (since he is no different to them) and finally, the description of social conduct is based on the hermeneutic task of getting to the meaning which human agents themselves draw upon in constituting and reconstituting their social world.

3.1.3 Role of theory in interpretive research

The final point in clarifying our methodological foundation relates to the role of theory in this research effort. The conceptual model based on Leavitt's diamond initially described in Chapter 2, was developed at the outset of the research as a broad, almost generic guide to support our thinking through the research problem and to embark on data collection. Because of its broad and 'loose' nature, it did not present a rigid way that stifles the emergence of new, unexpected issues and dimensions. This is obvious by the way our thinking on the role of IS in relation to structure evolved: starting off with a categorical belief that IS cannot lead to empowerment under any conditions (see Chapter 1), this view was confirmed by the respondents' comments in the questionnaire, while further emerging case study findings suggested that the initial assumptions and expectations were not fully representative of the perceptions and views of the agents involved in the real-life setting, and prompted a modification and moderation of this initial conceptualisation.

Hence we managed to preserve a considerable degree of openness to the field data and remained sensitive to the empirical context studied, something particularly desirable in the interpretive tradition (Walsham 1995). Therefore the initial conceptual model was qualified and revised through an iterative

process of data collection and analysis. The ideas of structuration theory did not inform our research from the outset: they were gradually incorporated in the process, but were found particularly valuable during the final stages of data collection and analysis. The structurational model developed in Chapter 2 provides an explanatory overview of IS support in empowerment but is general enough so as not to be prescriptive and 'gag' the empirical data. In essence, the use of the theory in this research was seen as a means to better understand and explain the data through an iterative process, while it is clear that the latter were not specifically collected in order to elucidate a particular theory (Steinfield and Fulk 1990).

3.2. Research methodology

3.2.1 Addressing the research questions

In order to understand whether and how the use of IS supports employees in organisations that are encouraging empowerment, empirical research was required, especially since the existing literature on this topic was extremely limited when this research commenced. Most of this literature on empowerment reports practices developed in the USA, and there has not been any recent survey of empowerment practices in Britain. Taking into account the significant contextual and historical differences between the two countries, it soon became obvious that there was a need to conduct a survey of manufacturing firms in Britain. A field survey of practice is recommended if little is known - as in this case - about the social phenomenon under investigation (Davis 1992). Benbasat et al. (1987) also suggest that when the research is highly exploratory, as in our case, a single study (in the form of either a survey or case study) may be useful as a pilot, that will aid in the identification of the appropriate unit and familiarise the researcher with the phenomenon in its context (Benbasat, Goldstein et al. 1987). The survey will attempt to provide a broad overview of how empowerment is perceived and practised in manufacturing and of its relationship with information systems. It is also crucial to establish whether empowerment is indeed happening in 'real

life', and that it is something of interest to people other than this author. As Robey (1996) critically notes, researchers in the IS field often pursue aims of interest only to themselves. A more justifiable criterion would be to choose aims that are relevant to practical issues in business and organisations (Galliers 1997).

Therefore the research questions guiding the survey were firstly, whether empowerment is indeed adopted by British manufacturers and secondly, whether (and to a far lesser extent how) IS are perceived to provide support in relation to it. As our thinking developed through the research process and the survey did suggest that empowerment is indeed 'happening' and that there is a perception that IS can support empowerment in various ways, the initial research questions were modified and 'deepened': after the 'what' and 'whether' questions, new questions arose interested in finding out the 'how' and 'why' of IS support to empowerment. How do IS support empowerment in manufacturing organisations? Since many difficulties were uncovered constraining this support, why do these difficulties occur? As Yin (1994) notes these types of research question are likely to require the use of case studies in order to understand the complex organisational situation of empowerment adoption and the role of IS. Interpretive research rarely ends where it began as new meanings are uncovered and explored and iteratively included in the original construction of the problem. There are no discrete hypotheses that need to be tested and confirmed or refuted, just a continual quest for a better, deeper knowledge, the boundless generation of 'rich insight' (Walsham 1995). Figure 3.2 depicts the research process structured along the basis of relative 'depth' of research questions:

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Broad research question

Focused research question
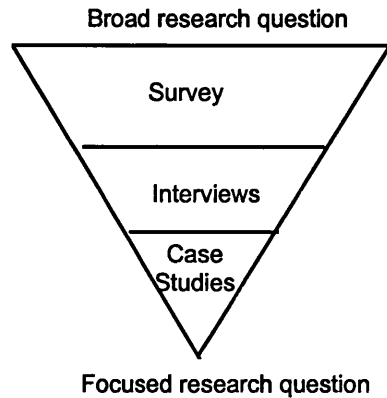
Figure 3.2: Development of the research question

Although the precise conceptual trajectory of the research could not be traced from the beginning, the nature of the subject under study made us anticipate the need for in-depth understanding and thus case study research. Therefore the survey also served as a 'compass' aimed at exploration, that provides a broad overview but also guides towards the organisations that are undertaking empowerment, where more in-depth study can be undertaken. The initial survey was complemented by a series of qualitative, in-depth interviews, which were followed subsequently by two further case studies.

This however means that our research strategy integrates two methods which have traditionally been viewed as belonging to opposing philosophical perspectives, and therefore merits further justification.

3.2.2 Quantitative or qualitative?

Methodologically the debate in information systems and organisation studies centres on the divide between quantitative and qualitative research (see Denzin and Lincoln 1994). Burrell and Morgan (1979) determined this dichotomy as nomothetic vs. ideographic (see Figure 3.1). Historically, the emphasis has been on quantitative studies (Galliers 1992; Straub 1989; Van Maanen 1979b). Nomothetic approaches focus on scientific rigour and the process of testing hypotheses. The concern is for systematic protocol through the construction of scientific tests and the use of quantitative techniques for the analysis of data. Bertrand Russell (1931) conceptualised the former

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process as leading to scientific law. A quantitative method assures objectivity, by use of established research instruments and formulaic procedures (Guba and Lincoln 1994; Straub 1989). Prominent tools used are surveys, questionnaires, personality and other standardised research instruments.

Idiographic approaches, on the other hand, are based on the view that the social world, organisations, and hence IS can only be understood by obtaining firsthand knowledge of the subject under investigation. These approaches emphasise that the researcher should get close to the subject and explore in detail the life history and background. Qualitative research enables the collection of rich, symbolic, contextually embedded, cryptic, and reflexive data yielding potentially meaningful insights (Van Maanen 1979b). Indeed, idiographic research pays greater attention to description and discovery and less emphasis on testing and verifying of hypothesis. It generates theory rather than tests theory (Straub 1989). This is not to say that theory does not undergird qualitative research. On the contrary substantial theoretical frameworks are employed (Miles and Huberman 1994; Yin 1993); only grounded theorists disregard the use of theory (Eisenhardt 1989; Strauss and Corbin 1990). Some of the techniques that have been used are interviews, text analysis, observations and active participation.

The conventional nomothetic approach has been shown to have a number of implicit drawbacks. For example, the precision of quantitative methods focuses on a selected subset of variables, which necessarily strips from consideration other variables that exist in the context (Guba and Lincoln 1994). The rich descriptions are lost. Secondly, quantitative researchers seldom are able to capture the subject's true perspective because they rely on more remote and inferential empirical materials (Denzin & Lincoln 1994). Finally, the nomothetic approach perceives humans as physical objects, which does not provide for rich insights into the meaning and purpose humans attach to their activities. Only a limited perspective is attainable of human behaviour (Guba and Lincoln 1994). Idiographic approaches, on the other hand, have a similar number of limitations. For example, qualitative research may not be well formulated, as there are few concise conventions to guide the

researcher in analysis (Pettigrew 1985; Sanders 1982). Secondly, qualitative researchers are found to overly rely on their personal skills when interpreting the results of research, which can introduce potential biases or unheralded assumptions in the analysis (Galliers 1992).

Although we appreciate the limitations of qualitative research we need to emphasise that qualitative research is the dominant strategy in this research effort in line with our interpretive paradigm. The strengths of qualitative data have been explicitly proclaimed by Miles and Huberman (1994, p.10):

- qualitative data depict naturally occurring, ordinary events in natural settings, thus more closely representing "reality" as this is perceived by the participants in the setting
- because of their "local groundedness", the fact that the data are collected directly in the specific local context of the case under study, the possibility for understanding latent, underlying or not obvious issues and concerns is very strong. This understanding is impossible in the analysis of e.g. survey data, as we discovered in the survey we conducted (see Chapter 4, Section 4.1.4). This local groundedness however can pose the question of the extent to which the findings can be transferable to other local contexts (Gherardi and Turner 1987).
- the richness that is usually characteristic of qualitative data has the power to tackle complexity and even to assess causality by revealing interrelated causes and consequences. In this way we can go beyond "snapshots" that demonstrate the "what" and "how many". This is particularly useful for the study of information systems in use, as numerous actors and issues will have to be taken into consideration.
- the focus of qualitative data on people's thoughts and words as they are revealed, especially through interviews and informal discussions, allows the researcher better access to the meanings that people place on their experiences, their perceptions and assumptions of the social world around them. These are the aim of an interpretive enquiry in general but also are of particular importance to our research question which tries to understand

how members of manufacturing organisations see the role of information systems in relation to their job and responsibilities.

Miles and Huberman (1994) attribute two more strengths to qualitative data that we believe can equally be attributed to quantitative data, providing that similar collection procedures were followed; they say that:

> "the fact that [qualitative] data are typically collected over a sustained period of time makes them powerful for studying any process (including history)" (Miles and Huberman 1994, p.10).

Quantitative data however can also be collected to refer to a long period of time (e.g. by looking at old records) and can therefore be useful for following a process and its trends, tendencies, etc. What they cannot show however are the reasons behind the various trends. They also claim that qualitative studies possess an "inherent flexibility" regarding data collection times and methods which can be varied as a study proceeds and which "gives further confidence that we've really understood what has been going on" (Miles and Huberman 1994, p.10). However, although we do not pursue the issue in this study, we cannot see any a priori reason why quantitative designs cannot incorporate similar flexibility in order to study a phenomenon over a longer period of time or with a different method, as long as there are no resource restrictions.

Miles and Huberman (1994) make three more claims for the power of qualitative data which we think are more related to qualitative research *methods*. They stress their strong potentiality for discovery, exploration of a new area and the development of hypotheses as well as for testing hypotheses. Finally, they proclaim that qualitative data are valuable in supplementing, validating, explaining and illuminating quantitative data about the same setting (Miles and Huberman 1994). This last view is echoed by many other qualitative researchers that point to the strengths of combining qualitative and quantitative research approaches as we discuss in the following section (Morgan 1983).

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3.2.3 The value of combining quantitative and qualitative methods

Instead of viewing qualitative and quantitative methods as rival camps they can be seen as complementary (Jick 1979). The value of combining qualitative and quantitative research approaches lies in their synthesis: in the possibility of combining their strengths and alleviating the limitations of the one by including its alternative.

Giddens (1984) proposes that there are four levels for social research:
1. hermeneutic elucidation of frames of meaning
2. investigation of context and form of practical consciousness (the unconscious)
3. identification of bounds of knowledgeability
4. specification of institutional orders

Giddens notes that the division between qualitative and quantitative research methods can be attributed to the distinction between (1) and (2) on the one hand and (3) and (4) on the other. Researchers working within the objectivist and structural sociology perspectives tend to favour quantitative methods that enable them to capture the institutional elements of social life that stretch beyond any specific context of human interaction. They are more concerned with proposing generalisations about social action and hence are bound to move on levels (3) and (4). On the contrary, the use of qualitative methods is promoted by those that emphasise (1) and (2) and the necessarily situated and meaningful character of social interaction.

Giddens finds that the opposition between these two perspectives is closely related to the dualism between action and structure and proposes that the duality of structure bridges this conflict. The situated nature of interaction is not a barrier to the institutional 'fixity' which structures show through time and space but rather a necessity and, vice-versa, without structure even the most brief social encounters would not be possible. Thus (1) and (2) are essential for understanding (3) and (4) and equally (3) and (4) are critical for understanding (1) and (2).

As Giddens himself points out:

"[...] qualitative and quantitative methods should be seen as complementary rather than antagonistic aspects of social research. Each is necessary to the other if the substantive nature of the duality of structure is to be 'charted' in terms of the forms of institutional articulation whereby contexts of interaction are coordinated within more embracing social systems" (Giddens 1984, p.334).

Therefore by resolving the conceptual dualism of prior research perspectives, structuration theory could also be seen to resolve the conflict between qualitative and quantitative research approaches.

In the last few years this view has been echoed in the IS field. Although traditionally quantitative methods informed by positivism have dominated IS research (Kaplan and Duchon 1988; Orlikowski and Baroudi 1991), the idea of combining research methods has recently been gaining ground (Gable 1994; Galliers 1992; Galliers 1995; Gallivan 1997; Kaplan & Duchon 1988; Lee 1991; Lee, Liebenau et al. 1997; Remenyi and Williams 1996). IS researchers have argued for the value of deploying a wide range of interconnected research techniques and combining research methods. Galliers (1995), for example, calls for a more careful consideration of the principle of plurality in IS research, i.e. the use of appropriate approaches in combination. In many instances this becomes critical as collecting different kinds of data by different methods from different kinds of sources provides the wider range of coverage that may result in a fuller picture of the unit under study than would be possible otherwise (Kaplan and Duchon 1988). Multi-method research improves the ways of making the worlds of experience that are being studied more understandable.

Robey (1994) and Hartwick and Barki (1994) similarly argue that researchers should use multiple research methods, including both variance and process research strategies, to investigate social processes. Kraemer (1991) maintains that survey research is greatly enhanced when used in conjunction with other qualitative research methods. A comprehensive review of the arguments for the combination of research approaches within a single design can be found in Gable (1994), who supports the integration of case study and

survey research methods. Attewell and Rule (1991) highlight the limitations of the survey method and the "obvious complementarity between survey and fieldwork approaches to studying information technology", contending that "[e]ach is incomplete without the other" (Attewell and Rule 1991, p.314). In line with the above, a selection of a "mixed method" research design (Gallivan 1997) is justified by both the practical demands of the topic and broader methodological considerations.

3.2.4 Survey method

The survey has proved a very popular research method in information systems (Grover, Lee et al. 1993; Kraemer 1991). Survey research according to Benbasat (1984) involves:

1. Data collected through structured interviews with standardised questionnaires and/or mail or telephone questionnaires;
2. Respondents contacted in their offices or homes or through the mail; and
3. No experimental manipulation of the independent variables.

The survey method seeks to discover relationships that are common across organisations, by studying a representative sample (Gable 1994). The aim is to provide generalisable statements about the object of study. Surveys can provide a reasonably accurate description of real world situations, and contribute to greater confidence in the generalisation of results (Galliers 1992). Surveys can be very useful for theory building; they can capture the role played by such factors such as organisational size which are likely to moderate relationships (Kraemer and Dutton 1991). Such contingencies are critical to the formulation of theory and are impossible to capture by case studies.

The criticisms surrounding survey research have two different dimensions even though these are frequently confused. As Lee rightly notes, depending on the larger research context, some ways of doing surveys are good, and some ways are bad (Newsted, Chin et al. 1996). IS survey research has been extensively criticised in respect of various methodological shortcomings

(Baroudi and Orlikowski 1989; Grover, Lee et al. 1993; Lucas 1991). However some of the things that surveys are criticised for, have nothing to do with surveys per se, but are related with the differences between interpretive and positivist research (Newsted, Chin et al. 1996). Surveys are not inherently a positivistic tool, nor are they unapplicable to interpretive research (Newsted, Chin et al. 1996). In the context of interpretive research they can elicit a broad picture of the subjective understandings that members of an organisation have. Survey questions can lead to more specific questions and can provide material to complement other sources of data (Newsted, Chin et al. 1996).

Nevertheless some of the main weaknesses of survey research in IS are (Kraemer and Dutton 1991):

- that it has been unable to yield a cumulative body of knowledge,
- that it is atheoretical, and
- that it is ill suited for addressing the subtle dynamics of IT in complex social settings.

From the above, only the latter point is related to the survey method as such and the other two pertain to the way the survey method has been employed in IS. Surveys are essentially snapshots of practices, situations or views taken at a particular point in time, which yield little insight into the underlying meaning of the data regarding the causes or processes behind the phenomena under study (Gable 1994). In this respect, the case study approach could complement the survey and therefore we will employ both approaches in our research.

3.2.5 Case study method

The case study method has received significant attention in information systems (Benbasat, Goldstein et al. 1987; Cavaye 1996; Lee 1989; Mumford, Hirschheim et al. 1985; Orlikowski and Baroudi 1991; Smith 1990; Walsham 1993a). The aim of the case study approach is summarised by Gable:

"The case study approach seeks to understand the problem being investigated (where the word "understand" is used in the phenomenological or hermeneutic sense, and

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where "understanding" the meaning held by a subject or group is contrasted with the "explanation" produced by a scientific observation)" (Gable 1994, p.113).

Yin (1994) defines the case study as:

"an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin 1994, p.13).

He adds that it:

"copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis" (Yin 1994, p.13).

These different definitions clearly demonstrate that case studies can be employed either within a positivistic research design or within interpretive research (Cavaye 1996). Characteristic examples of positivist approaches to case study are (Benbasat, Goldstein et al. 1987; Lee 1989; Yin 1993; Yin 1994) but also Eisenhardt (1989), while recently there has been a growing interest in intepretive case studies (Klein and Myers, forthcoming; Orlikowski 1992b; Orlikowski 1996b; Walsham 1993a; Walsham 1995). It is we believe important to make this distinction because the goals of the two are usually very different, and therefore something which is regarded as a weakness in respect of the criteria of the one school, might not be in terms of the other. Positivistic criteria have usually been applied to evaluate interpretive case studies and it is only very recently that principles based on interpretivism have been proposed (Klein and Myers, forthcoming).

A typical example of the way positivistic ideals have been applied to case studies can be found in Lee (1989) who evaluates previously conducted MIS case studies based on the "standards of the natural science model of scientific research". These are the need to make controlled observations and deductions, to allow for replication and to allow for generalisability. Similarly Yin (1994) puts forward four criteria for judging the quality of case studies:

- construct validity: establishing correct operational measures for the concepts that are being studied

- internal validity: establishing a causal relationship between certain conditions
- external validity: establishing a domain to which a case's findings can be generalised
- reliability: demonstrating that a study can be repeated with the same results

As we can see the emphasis in this approach is on treating a case study as an experiment, taking place not in a laboratory but in its natural setting, with the aim to deductively develop or test a theory. Eisenhardt (1989) asserts that the case study method is a research strategy which focuses on understanding the dynamics present within single settings. Benbasat et al. (1987) identify three strengths of case study research in information systems. Firstly, the researcher can study information systems in a natural setting, learn about the state of the art and generate theories from practice. Secondly, the method allows the researcher to understand the nature and complexity of the processes taking place and, finally, the case approach is an appropriate way to research an area in which few previous studies have been carried out (Benbasat, Goldstein et al. 1987). The fundamental problem in positivistic case studies however, lies in the basis upon which general inferences may be drawn from them and hence, on the difficulties associated with making generalisations from individual case studies.

The approach is different in interpretive case studies. Regarding generalisability Smith (1990) builds on the work of Mitchell (1983) who criticises the common assumption that the only valid basis of inference is one developed through statistical analysis. Mitchell (1983) points out that logical inference is epistemologically quite independent of statistical inference, the former being the process of drawing conclusions about the relationship between two or more characteristics in terms of some systematic explanatory schema. Therefore the inference from case studies is only logical; we can deduce that the features which are related in the case study will also be related in a wider population not because the case is representative but because the case analysis convinces that the relationship 'makes sense'

(Smith 1990). The validity of the inferences drawn from one or more cases does not depend on the representativeness of cases in a statistical sense, but rather on the plausibility of the logic of the analysis.

Yin's approach to generalisation is very similar to the above and refers to analytical instead of statistical generalisation, where in analytical generalisation the investigator is trying to generalise a particular set of results to some broader theory (Yin 1994). Yin's positivistic approach to case studies becomes evident though, as he explains analytical generalisation using an example of a case study of a neighborhood:

> "[t]he generalization is not automatic, however. A theory must be tested through replications of the findings in a second or even a third neighborhood, where the theory has specified that the same results should occur. Once such replication has been made, the results might be accepted for a much larger number of similar neighborhoods, even though further replications have not been performed" (Yin 1994, p.36).

Obviously this is a significant departure from Mitchell's and Smith's approach, treating the case study essentially as an experiment.

Our case study approach is guided by an adaptation of Klein and Myers (forthcoming) seven ideal principles for interpretive research. These principles integrate the philosophical roots of interpretivism and aim to help plan and execute the case studies by shedding light on important issues that deserve consideration during the process. These are not positivistic guidelines and nor are they abided by systematically, but rather act as helpful pointers. Table 3.1 briefly summarises our understanding of the principles.

Finally we should make one last point regarding the combination of qualitative and quantitative methods related to the notion of generalisability discussed above. It has been suggested that the incorporation of quantitative methods to case study research is frequently done in an effort to make the case studies representative (Smith 1990) (in such cases a survey usually comes after the conduct of the case studies). In this research the survey is not employed in order to make the case study research representative but is rather aimed at answering a rather different, broader research question (see Section 3.2.1

above). Hence, the issue of representativeness is viewed as irrelevant, in line with Mitchell's and Smith's arguments (Mitchell 1983; Smith 1990).

GUIDING PRINCIPLES
1. Contextual Principle Social, political, economical and historical background information of the research setting should be critically reflected upon, to ensure the readers of the study understand the context of the situation under investigation. Moreover, the context of the organisation(s) under study has a critical affect on the basic research design and the unit of analysis.
2. Effect of Interaction between Researcher & Participant Principle The research data requires critical reflection in light of social pressures that may have arisen from the interaction between the researcher and the participant. Researchers must recognise that the participant, as well as the researcher himself, is an interpreter and/or analyst of a given situations, whose interpretation alters with every interaction.
3. Abstraction and Generalisation Principle The idiographic findings revealed from the data of principles 1 and 2 require relating to the general concept of the nature of human understanding. To generalise then, depends "on the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them" (Walsham 1993a, p.15).
4. Theory & Data Dilemma Principle The data elicited may depict contradictions between the theoretical preconceptions - explicated in the research stance and theoretical framework - and the actual findings. These may become even more evident following a number of revision cycles.
5. Multiple Interpretation Principle Multiple interpretations of the same issue or situation under study requires sensitivity to differences in interpretations of the participants. Contradicting data inherent to multiple interpretation may illustrate biases or important research avenues to consider, and can be immediately confronted in the study. Commonalties show strength of data.
6. Critical Thinking Principle Sensitivity is required to biases and distortions in the data collected from participants. Data should not be taken at face value.
7. Gestalt Principle The gestalt of the findings of the study under investigation will only be brought to light by the sum of all its parts. Only by integrating all the previous principles can we ensure 'that we come to understand a complex whole from preconceptions about the meaning of its parts'. (Klein and Myers, forth.)

Table 3.1: Principles for interpretive case studies (adapted from Klein and Myers (forth.)).

3.3 Research design

The previous sections provided the justification for the research approach that was adopted in order to address the phenomenon of interest. This section describes in detail the methods and techniques adopted in the research process. Table 3.2 presents the details of the empirical research process and the relevant time frames.

Empirical research	Time period
Survey	
survey design	January 1996 - March 1996
pilot survey	April 1996
follow-up, questionnaire redesign	May - June 1996
postal survey, reminder	July - September 1996
statistical analysis	September - November 1996
Interviews	December 1996 - February 1997
Case studies	
BICC Cables	January - July 1997
Blue Circle Cement	December 1996- September 1997
Total duration	January 1996 - September 1997

Table 3.2: Overview of empirical research process

The core field work was carried out between January 1996 and September 1997 in the UK. The same approach of multiple methods was also applied in data collection. Numerous data collection techniques were employed including questionnaires, semi-structured interviews, direct observations, and secondary document analysis. Mumford maintains that the research methodology should use:

"a blend of techniques all of which reinforce each other by providing (the researcher) with different but complementary data" (Mumford 1985, p.317).

Benbasat et al. (1987) maintain that multiple data collection methods are typically employed in case study research and that ideally, evidence from two or more sources will converge to support the research findings (Benbasat, Goldstein et al. 1987).

3.3.1 Survey design

The survey design was drawn up through a detailed and lengthy study of survey methodology literature in the social sciences (Gray and Guppy 1994; Hyman 1955; Fink 1995; Fink and Kosecoff 1985; Fowler 1993). Particular attention was paid to what Grover et al. (1993) have termed "survey methodological attributes" - a set of desirable characteristics in conducting and reporting survey research (Grover, Lee et al. 1993). The survey was designed to be exploratory (as opposed to descriptive and explanatory) as there is very little data on empowerment adoption in British manufacturing. It can also be termed "diagnostic" which according to Hyman (1955) means concerned with the contribution of a number of factors to the determination of

some phenomenon, involving a search for possible causes in a relatively unknown realm.

Sampling

The target group for the study or else the "study population" is the British manufacturing companies that have adopted or have been involved with empowerment. Obviously the prime goal of the survey is not to measure how many companies have adopted or have attempted empowerment but rather to understand the phenomenon by gathering information from those that have. The goal is not to generalise to the whole of the British manufacturing industry but only to the companies that are involved in empowerment. Kling (1991) argues that theoretical sampling (rather than random) can yield more meaningful research results. Therefore, the most suitable sampling method is not random sampling, but purposive sampling in order to obtain as much information as possible on the research problem (Attewell and Rule 1991).

Naturally, there were no preexisting data that could aid in locating these companies. From the literature however, some general population characteristics could be extracted, that in the majority of cases seem to apply to organisations that are involved in empowerment. For example, large organisations were frequently chosen as a suitable sample for similar research exercises as they are in general more willing to attempt change initiatives due to the significant resources they possess compared to smaller enterprises (Lawler, Albers Mohrman et al. 1992). In Britain, it has also been found that more information is given out to employees in larger organisations (Millward, Stevens et al. 1992).

"Managements in larger establishments ... more commonly consulted or provided a lot of information than those in smaller establishments (Millward, Stevens et al. 1992, p.170).

As the provision of information is strongly linked with both empowerment and information systems, large organisations appeared as the most appropriate sample. Furthermore, empirical evidence suggests that large organisations have more advanced and sophisticated information systems and therefore

fulfill the necessary criteria for both aspects (Schein 1994; Scott Morton 1991).

According to the above, "The Times 1000" 1996 listing was used. Regarding the sample size an initial number of 500 companies was deemed as adequate for our purpose (Fowler 1993; Gray and Guppy 1994). However, as the Times 1000 listing did not provide enough manufacturing companies, we further used the Lotus Source One database to complete our sample. In total 450 companies were identified. As most of the Times 1000 organisations are very large establishments, with more than one site and headquarters in most cases at a different location, we tried to contact one of their main manufacturing sites. In cases of holding companies, further research (e.g. company reports) was needed to identify the larger subsidiaries.

The choice of the most appropriate respondent was difficult, as the research questions touch on both information systems and organisational issues. The person that was selected as best suited to provide the necessary data was the personnel director/manager. As our focus is on the organisational and social context that empowerment creates and the role of information systems in that, it was felt that IT department professionals would not possess as rich an understanding of this context as personnel directors. On the other hand, it was felt that since personnel directors are more in touch with the employees that use the systems, they could be seen more as users in the assessment of the role and value of information systems in empowerment. It was assumed that in cases where the personnel director did not possess enough knowledge of IS use in the company, he/she would forward the questionnaire to the IT department; indeed that was often the case (see Chapter 4). We decided on a single-respondent, because we were going to capture more views by qualitative research later on. Thus the questionnaires were personally addressed to personnel or human resources directors/managers. The addresses and names of Personnel Directors/Managers or Human Resource Directors in the 450 companies were collected in a database with the help of "The Personnel Manager's Yearbook" (Kershaw 1996).

Questionnaire design

The questionnaire was designed in order to address the two main research areas: the promotion and operationalisation of empowerment and the use of information systems by empowered employees. An initial questionnaire was developed and tested. The first design was informed by a similar questionnaire which was used in the studies by Lawler, Albers Mohrman et al. (1992 and 1995) which focused on employee involvement practices and the adoption of TQM.

One of the most critical dimensions was providing a definition of empowerment to ensure as much as possible that all respondents have the same understanding of what is asked (Fowler 1995). In our case this was extremely difficult but also necessary. We decided to provide a broad indication by what we mean by empowerment in the cover letter as well as on the questionnaire itself, while also introducing "validating questions" to extract the respondent's understanding of the term (construct validity) (Fowler 1995). Many questions were multiple response in an attempt to assist the respondent.

The questionnaire was initially posted to 30 manufacturing organisations which were selected at random from The Times 1000 listing, and to 4 researchers, selected either because of their knowledge of the issue or due to their significant experience with survey research. The pilot survey proved very useful in highlighting:

- issues that arose from the technical form of the survey instrument (e.g. descending order and start from 1= most important use)
- unclear, badly expressed questions that confused the respondents (e.g. 12 & 13 in the initial questionnaire)
- other issues that appeared important from the answers that we had underestimated (e.g. the issue of skills)

These were taken into account and the initial questionnaire was modified significantly. Both versions of the survey instrument are presented in

Appendix 1. Particular attention was paid in making the questionnaire as short and as precise as possible, bearing in mind the heavy workload of the respondents (Fowler 1993). Most questions are of a closed form while some require the respondent to comment.

Finally, we have to stress the subjective nature of the information that we aim to elicit from the questionnaire. Questions are presented in a subjective form purposively (e.g. 'do you believe', 'in your view') as the goal is to gather personal, individual interpretations of the phenomenon under investigation. This strong subjective character of the survey data, is by no means considered a flaw or a statistical bias, but instead it was deliberate and constitutes an important advantage of this research (Newsted, Chin et al. 1996).

Description of the survey

Due to the large sample size and the geographical dispersion of the sites all over Britain, a postal survey was chosen as the most cost-effective solution (Gray and Guppy 1994). The survey was carried out in two phases. First, the pilot survey was carried out to test both the survey instrument, but also the choice of sample and suitability of respondents. Thirty questionnaires with a cover letter (see Appendix 1) were posted in April 1996. Until June 1996 only 5 responses had been received. The main problem that was faced at this stage was the validity of the addresses and the names gathered. In our telephone follow-up of the pilot survey, we contacted 10 companies that had not responded and found that some companies had changed address or had been acquired by another company, that individuals had left the company and thus their personal mail was not opened, and so on. However, it was still felt that the response rate would be much higher if the questionnaire was personally addressed. In the second phase of the survey, 450 questionnaires were sent out in July 1996. A reminder letter was sent out in September 1996 to 120 of the companies that had not yet replied. There was no further follow-up action due to time pressures.

Statistical analysis

The possible answers to the questionnaire were coded. A database was created in SPSS with the data from the questionnaires. SPSS was also used for data analysis and the presentation of the results.

The analysis of the questionnaire was performed along three main streams that correspond to the three areas of general interest:
1. The introduction of changes in work organisation
2. The empowerment element
3. The support that IS provide to the organisation in the new situation created by empowerment

Based on these three areas, we performed a series of analyses, both of individual variables and of variables in combination, in order to determine possible correlations between them (Fink 1995). The individual analyses examined the general characteristics of the study population regarding change initiatives, employee empowerment and information systems. The analyses of variables in combination attempted to correlate some characteristics of empowerment with information systems issues. The identification of relationships between variables was carried out in SPSS, and was essentially based on the chi-square test, since most answers were coded into nominal variables (Fink 1995).

The results from the statistical analysis were summarised in a report that was posted to all respondents in April 1997. The cover letter accompanying the report encouraged any feedback regarding our results and indeed some feedback was received from a few respondents.

3.3.2 Series of qualitative, in-depth interviews

The survey provides valuable data on the current situation regarding empowerment (where and why it is introduced, what it means, its true extent, etc.). However, we observed the limitations of the survey approach in practice

(see Section 3.2.4); it provides a lot of data but allows little insight into the reasons behind events and is also very poor in providing supplementary data that can sketch out the whole picture. That is why we proceeded to a series of in-depth interviews to elucidate the context and provide additional information on the issues addressed in the survey. This type of qualitative research can be termed 'collective case study' or 'multisite qualitative research' (Stake 1994).

Case selection

The objective of the series of in-depth interviews was to explicate and illuminate the answers provided in the questionnaires. Selection was essentially based on the information that was provided on the questionnaire taking into account for example, the changes conducted or the delegated decision making responsibilities and including companies where IS were seen as constraining empowerment. We also aimed to include a wide range of products and manufacturing processes in order to encompass as many different manifestations of empowerment as possible. An extensive use of IT in support of all operations was also an important criterion for selection.

From the respondents to the survey around 60 had noted that they would be willing to discuss their answers to the questionnaire further. Forty responses were identified as potentially interesting for further research and letters were posted out to the original respondents in October 1996 (see Appendix 2). Subsequently around twenty companies were selected as the most interesting (based on the criteria noted above) and these were contacted by telephone first. Practical travel limitations were also taken into account as the manufacturing sites were geographically spread out all over Britain, and thus we attempted to 'cluster' sites that were geographically close and coordinate some visits. Apart from one respondent, all other participants agreed to be interviewed and thus no further calls to the remaining "second choice" companies were made. Interview dates and meetings were finally arranged with 18 manufacturing companies.

At the time, it was thought that car manufacturers (Jurgens, Malsch et al. 1993), could be of particular interest for the role of IS in empowerment as auto plants have for quite a while adopted production approaches that are based on teams, particularly semi-autonomous ones (Neumann, Holti et al. 1995). Therefore they could provide a mature context for the study of empowerment. Hence a large proportion of the companies selected were involved in vehicle manufacturing (the subsequent interviews revealed that empowerment is very difficult in most car manufacturers and assembly lines, where the pace of the work is tightly controlled by the line).

Interviews were also conducted at two plants of the same large manufacturing company (Vauxhall Motors) in order to establish whether different plants develop very different approaches to empowerment and thus to identify the most relevant unit of analysis (Yin 1994). Some differences did indeed surface in the two interviews, and thus in the later case studies, we visited numerous sites to capture local contingencies as well as broader, corporate directions.

Design of interview agenda

As one of the objectives of the interviews was to understand better the responses to the questionnaire, a semi-structured agenda was deemed most appropriate (Kvale 1996). The first part of the interview was designed to go over the interviewee's responses to the survey, elaborating, explaining and clarifying on the way. The questions were adapted to each interview depending on the respondent's comments on the questionnaire. Also particular issues of interest were explored as and when they appeared in the discussion through probing and further questions. The second part of the interview moved away from the questionnaire and addressed the experiences of the company with IS support for empowerment and elicited the informant's perceptions and opinions on the issue. The interview agenda, and a list of the research participants with interview details is presented in Appendix 2. Due to the many open-ended questions, the interviews were not rigid and particular attention was paid to maintaining a 'flow'; thus the order of the questions on the agenda was never followed precisely, but it rather served as a guide to ensure that all critical points had been covered.

Conducting the interviews

Consequently, 20 in-depth interviews were conducted with the people who had personally completed the questionnaire and in two companies supplementary interviews were conducted with one other manager. All interviews were conducted between December 1996 and February 1997. Except for one interview which was conducted over the telephone, all interviews were conducted in person and lasted between one to two hours each.

The author conducted the interviews as part of an on-site visit in 16 of the 18 cases (one interview was conducted over the phone, and one informant came to the London School of Economics specifically for the interview). In about half of all the cases, the author visited the company's head office and in the remaining cases the interview was conducted at one of the company's manufacturing sites (see interview details in Appendix 2). In the latter case, the author was frequently shown around the plant, directly observing shopfloor work and use of IS, and having informal discussions with employees. All on-site visits were particularly valuable as they allowed the author to come frequently into social contact with members other than the main informant (e.g. drivers, secretaries) and provided unexpected opportunities to interact with employees and absorb some of the atmosphere of the organisation (e.g. through lunch at the canteen or in the company bus taking employees to the local train station at the end of the shift).

The author was particularly aware of her impact on the interview and tried to maintain a balance between straightforward questioning and engagement in a 'real' two-way conversation with empathic understanding and exchange of views (Fontana and Frey 1994; Walsham 1995). This might be discouraged by traditional interviewing techniques, but the author felt that such an approach treats the informant as an equal and moderates the perceived control position of the interviewer thus leading to a more honest and natural interview.

All interviews were tape recorded (Smith 1990). Since the issue is rarely sensitive or highly confidential we did not envisage any problems with the interference of the tape recorder (Walsham 1995). All informants were explicitly asked at the beginning of the interview whether they would prefer not being taped and no one expressed such a concern or was perceived as feeling uncomfortable with the recorder. In fact it was felt that informants are rather used to the idea of the tape recorder and there were no signs of it having an impact on the discussion.

The tapes were subsequently fully transcribed (the author transcribed more than half of all the 20 interviews herself). In contrast to Walsham's view on the disadvantages of tape-recording (Walsham 1995), we found it to be absolutely critical in capturing the extensive amount of data provided during the interview which is impossible to record through note-taking, but also in 'preserving' the interviewees' understanding and interpretations through their own words. Notes taken through the interview are simply unable to maintain the specific expressions and words that an interviewee used, which are critical in interpretive research.

Furthermore, as soon as the interview was over, the author jotted down some notes summarising the findings, trying to preserve any significant details related to the context of the interview, and plotting the chronological development of ideas. This idea of keeping a journal during the research was thought at the time to be a personal 'innovation' of the author, only to find out later on that it has been advocated by various other researchers in the social sciences (Mills 1959; Smith 1990).

Additional data collection

Although the interviews provided the primary data, particular attention was paid to collecting additional documentation from alternative sources, on all the cases. Annual company reports were consulted for each case and other diverse published and unpublished material was studied. This ranged from internal reports on IS or empowerment-related issues (as in the case of Glaxo Wellcome and Caradon) to press articles (e.g. on the much publicised

Vauxhall Motors employee agreement, (Jones 1998; Lorenz 1998) to a doctoral dissertation with a case study on Rover's IS practices (Periasamy 1994) and a book drawing on the way teamwork was developed in BICC Cables, Leyland and Rover (Neumann, Holti et al. 1995). Company Internet sites were accessed and useful information – from financial and press releases to historical and product-related – was obtained this way. An effort was made to read all available relevant material before the interview so as not to waste too much of the interviewee's time in discovering 'hard' facts that could be picked up from somewhere else, and thus getting more out of the interview from an interpretive point of view.

The contextual information from other references and all primary data were studied in detail and a combination of case and aggregate analysis was carried out (Smith and Dainty 1991). The analysis tried to maintain a balance between looking at each case individually and at the same time comparing it to the other cases and regarding it as part of a whole. The data were collected according to each case and from the interview agenda a logical pattern of topics was elicited. This was facilitated by the fact that the first part of the interview was focused on shedding light on answers to the questionnaire and therefore was similarly structured across the cases. The interviews were read many times each. The main topics were identified and given a code which was then noted on the transcriptions as they were being analysed. The coding was really only a way to cope with the large volume of data and assisted the author in remembering what each section was roughly about. Emerging issues and interesting perspectives were noted and further explored through the other cases.

3.3.3 Case studies

From the 18 companies where interviews were conducted, five were selected as potentially interesting for deeper case study research. Procedures for establishing company interest were initiated through letters, calls and so on, and finally two case studies were conducted.

Case selection

As noted above, the selection of the cases in the interpretive tradition does not rest on how typical or representative a case may be, but rather on its potential explanatory power (Smith 1990). Stake (1994) distinguishes between three types of purpose for studying specific cases: the intrinsic case study is undertaken because one wants better understanding of this particular case. The instrumental case study is carried out to provide insight into an issue or refinement of theory.

> "The case is of secondary interest; it plays a supportive role, facilitating our understanding of something else.[...] The choice of case is made because it is expected to advance our understanding of that other interest. Because we simultaneously have several interests, often changing, there is no line distinguishing intrinsic case study from instrumental; rather, a zone of combined purpose separates them" (Stake 1994, p.237).

The third type is a collective case study where researchers study a number of cases jointly in order to inquire into a phenomenon, population or general condition. It does not involve the study of a collective, but an instrumental study extended to several cases. This latter approach was the one followed in the series of in-depth interviews, whereas our approach to the selection of our cases is perfectly summarised by the above quote from Stake, and we see both our cases as essentially instrumental.

Through their responses to the survey and the subsequent interviews both BICC Cables and Blue Circle Cement presented cases that could provide insight into the role of information systems in empowerment. Although in theory the organisations seem to perceive IS as a supportive tool for empowerment, the initial interviews revealed a wide range of concerns and difficulties with their existing information systems, which suggested that a case study in each company would be of interest and value to this research.

A multiple-case design was selected in order to follow neither a replication logic as Yin (1994) propounds, nor a 'sampling' logic. Two cases were studied in order to provide richer insight and understanding emerging from cross-case comparison and analysis of issues and circumstances. Nevertheless we have to make clear that the comparison is not the main goal of the case studies; the

comparison does not by any means substitute the case as the focus of the study. Concerns have been raised in social research that comparison between cases tends to fix attention upon the few attributes being compared and obscuring other knowledge about the case (Stake 1994). This is certainly not the approach adopted here as will be evident from our case studies; the notion of comparison is only brought into the analysis as a final perspective aimed to enhance understanding of the case rather than generalisation beyond it. As Miles and Huberman (1994) explain:

"At a deeper level the aim is to see processes and outcomes across many cases, to understand how they are qualified by local conditions, and thus to develop more sophisticated descriptions and more powerful explanations" (Miles and Huberman 1994, p.172).

In-depth interviews

The following sources of information were employed to create a rich set of data surrounding the specific research issue and capturing the contextual complexity (Myers 1997; Yin 1994): in-depth interviews with members of the organisation, documentation - written material of every kind, and direct observation - observing and noting details, actions and discussions within the organisation [1]. The main research method employed in the case studies was in-depth interviewing. In BICC Cables 13 in-depth interviews were conducted and the informants were mainly identified with the help of the Personnel Director and a 'snowballing' process (one informant suggests someone else to speak to, and so on). In the case of Blue Circle a snowballing process was the main vehicle for selection and ten in-depth interviews were conducted. In both cases a particular interest was achieving a variety of perspectives and views, and hence different hierarchical levels, functions and knowledge of IT were sought (see Chapters 5 and 6 for informant details). In both cases we interviewed employees at the Head Office, at the divisional level and at the site level. Lists of interviews and details are included in the case study chapters. The techniques used were the same as in the series of interviews

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[1] Yin (1994) provides a detailed analysis of the strengths and weaknesses of each source of evidence (pp.78-94).

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(see Section 3.3.2 above). The interview agendas are presented in Appendices 3 and 4.

Additional data collection

As in the series of in-depth interviews (see Section 3.3.2 above), additional data collection was carried out, only to a greater extent, since the author spent more time on the case study sites and came into contact with more employees. All interviews lasted between one to two hours each and on-site visits typically involved a half-day period.

During the site visits the author had numerous opportunities for direct observation of work practices and IS use, as she was shown around the plant, was demonstrated various IS and observed an employee training session for a new information system in Blue Circle Cement. Also useful data was collected through informal discussions at the plants.

Direct observation findings were captured as soon as possible after each site visit along with reflective remarks (Miles and Huberman 1994). These are reflections and commentary on issues that emerged in the field visit and have the unique quality of integrating the "fresh awareness" of the events that occurred on site with the researcher's feelings, impressions and first interpretations. These could be anything from a cross-reference to data from a prior interview to second thoughts on the meaning of what a key informant was "really" saying during an important exchange and so on.

Various written documents were also collected and consulted during the case studies: company newsletters, annual reports, internal confidential reports, presentations, posters with mission statements and so on (Hodder 1994). These provided both 'hard' data but also when interpreted provided alternative insights on the case. The type of alternative sources used were similar to the ones noted for the interviews (see Section 3.3.2 "additional data collection"), but in the case studies many more internal documents were made available to the author.

Case analysis

The analysis of qualitative data collected within a case study is probably the most contested issue within qualitative research (Miles and Huberman 1994; Yin 1981; Yin 1994). The analysis of each case focused essentially on the transcripts of the interviews; the general analytic strategy was to follow our specific research questions, and the theoretical concepts that emerge from our structurational model. As the main part of our study of structuration theory took place at the same time, an interesting interplay emerged between understanding the theory and understanding the data, which continued all the way through the case analysis.

The data collection process in the case studies produced a substantive amount of data (as an indicator, the interview transcriptions of only one case amounted to 300 pages). These had to be analysed and organised somehow. In this process we relied heavily on Miles and Huberman (1994) although realising their sometimes overly positivistic overtones (Smith 1990). The steps proposed in Miles and Huberman (1994) were treated as broad guidelines meant to facilitate the interpretive analysis. All interviews were transcribed in full (most by the author herself) and read multiple times as the analysis progressed. Coding was carried out as a means to get a 'grasp' on the amount of data, yet it was only used as a data-labeling and data-retrieval device.

Multiple memos were also written as the reading of the transcripts progressed, summarising and exploring ideas, and served as the main vehicle for idea generation and development. These memos were all dated and compiled in the form of a journal, which chronologically traced and recorded the case analysis. Also numerous graphs based on the structurational models presented in Chapter 2 helped to structure and guide data analysis. Finally we need to note that the case study reports - which in our case took the form of Chapters 5 and 6 - were developed gradually through approximately six revisions each. More details on the particular techniques and methods employed in case analysis are presented in Appendix 4.

Dissemination of results back to the field

Apart from the composition of the chapters in this thesis, the findings of each case study were summarised in two reports which were posted back to the companies. In this way the double hermeneutic circle that Giddens refers to has been 'completed' in a sense (Giddens 1984). The sociological descriptions that the social researcher comes up with have to be appropriated within social life itself. Our findings feed back into the particular social context and will subsequently affect the conditions of social reproduction through reflexive intrusions of knowledge (Giddens 1989).

A response to our findings was received in July 1998 from our main informant in BICC Cables, the Personnel Director, in which it was noted that the findings of the case study are interesting and thought provoking and that they merit further dissemination within the company. We are currently in the process of arranging this dissemination of our findings.

3.4 Summary - Conclusions

The main contribution of this chapter is the presentation and justification of the research approach employed in this study. The philosophical paradigm guiding the research was made explicit, something which, in combination with the nature of the research questions, enabled the selection of an appropriate research methodology.

Consequently the first section focused on the interpretivist paradigm in the organisation studies and IS fields and introduced hermeneutics and phenomenology as the underlying mode of analysis. The interpretivist paradigm defines our research methodology as idiographic, but with an emphasis on combining qualitative and quantitative methods. Our research design outlines our reasons for choosing both a qualitative case-study and quantitative survey approach. The final section provided detailed evidence of the research techniques and instruments that were used in the three stages of the research process, and described how data were collected and analysed with a focus on the practical aspects that needed particular attention.

CHAPTER FOUR

EMPIRICAL RESEARCH INTO EMPOWERMENT PRACTICE IN MANUFACTURING

This chapter presents and discusses the initial empirical research. The ideas derived from the literature review suggest that the use of IS in an organisation is strongly influenced by the specific organisational context. With these ideas serving as the backdrop of our research, we embarked firstly on a postal survey involving the largest 450 UK-based manufacturing companies, and subsequently 20 in-depth interviews were conducted in 18 companies selected from the survey respondents. These efforts resulted in three complementary sources of data: firstly, the responses to the questionnaire were quantitatively analysed, secondly, the respondents' own comments to open-ended questions in the questionnaire were interpretively analysed (Markus 1994), and finally the interviews provided a rich set of empirical evidence.

4.1 Findings of the exploratory survey of the role of IS in empowerment

As noted in Chapter 3, the survey was chosen as a suitable research methodology to achieve an accurate and up-to-date, albeit broad picture of the role of information systems in relation to empowerment in British manufacturing industry. There is limited data on the current forms of empowerment initiatives in Britain, and the existing data describe isolated cases rather than provide an overview (see e.g. De Cock and Hipkin 1997; McArdle et al. 1995). Thus a primary aim was to identify the general characteristics of the phenomenon. We expect that the shape that these have in Britain is likely to be quite different from the way in which empowerment is approached in the USA, Japan or Scandinavia (Kochan and Weinstein 1994), due to the particular industrial relations history and current position of industry. More specifically the purpose of the survey was to obtain empirical data on the following issues:

- the extent, form and rationales of empowerment promotion in British manufacturing industry;

- the characteristics of empowerment initiatives, their effects on the organisation and factors affecting their success;

- the feelings and perceptions of individuals regarding the successful outcome of empowerment;

- the use of information systems in empowering organisations, and factors that affect this use;

- any changes in information systems and their use that were caused by empowerment.

As noted in Chapter 3, the survey did not aim to produce precise statistical measurements of variables but rather a broad collection of views and practices.

From the total 134 received replies, we found 103 fully completed questionnaires, making an overall response rate of 29.8% and a usable response rate of 23%. The remaining 31 responses noted that the

questionnaire could not be completed due to unavailability of resources, or the original addressee had left the company and his/her position was unoccupied, or the questionnaire was sent to the Head Office which is responsible for many operating units with different practices, and so on.

Most of the 103 completed questionnaires were completed by the Personnel or HR Managers that were the original recipients. Nevertheless a few were passed on to IT managers and completed by them. Table 4.1 presents an overview of the distribution of respondents according to their job description:

Job Description	No. of responses	Percentage
Personnel/HR/Operations Director/Manager or employee	90	87.4%
IT/Systems/Technical Manager/Director	9	8.7%
No Answer	4	3.9%
Total	103	100%

Table 4.1: Distribution of respondents' according to job description

Figure 4.1 presents the distribution of companies according to industry sector and main product.
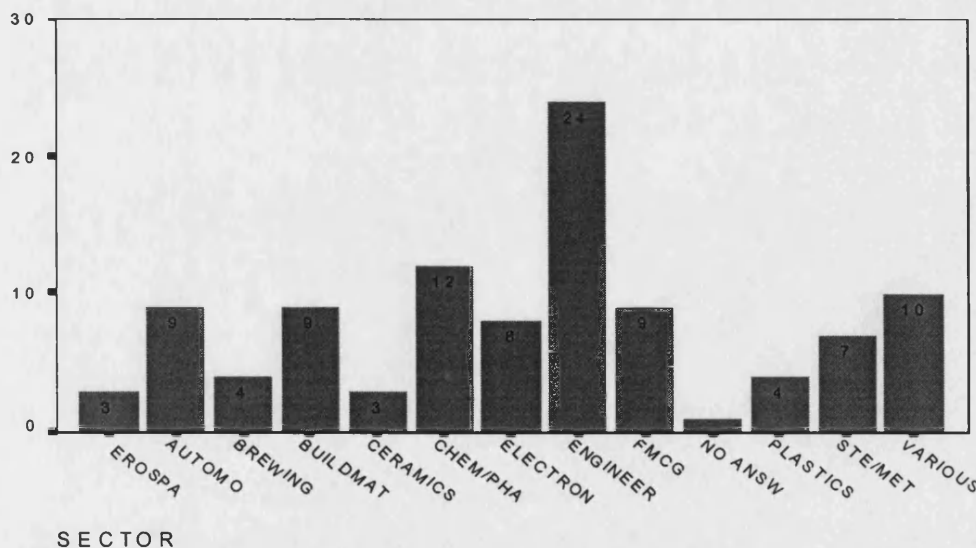
Figure 4.1: Distribution of companies according to industry sector.

where:

AEROSPA = aerospace	ELECTRON = electronics
AUTOMO = automotive	ENGINEER = engineering
BREWING = brewers and distillers	FMCG = fast moving consumer goods
BUILDMAT = building materials	PLASTICS = plastics
CERAMICS = ceramics	STE/MET = steel & metal
CHEM/PHA = chemicals & pharmaceuticals	VARIOUS = all other products

In the following sections we discuss the survey results along the three main parts of the questionnaire (see Appendix 1): changes in the organisation of work, the promotion of employee empowerment and the role of IS in empowerment.

4.1.1 Changes in work organisation

The responding companies appear very active in improving their organisation of work; an impressive 88.3% (91 companies out of the total 103) have introduced various change initiatives. Total Quality Management (TQM) is the most popular approach adopted by 63.1% of all companies. Delayering was also adopted by 55.3% of all companies, while downsizing (52.4%) and Business Process Re-engineering (BPR) (41.75%) were also widely adopted (the question permitted multiple responses). It is worthwhile noting that 33 of all companies (32%) adopted both TQM and BPR, while 21 companies (20.4%) reported that they had been involved in all four types of change initiatives. The chi-square test of the association between BPR and downsizing shows that the hypothesis that BPR and downsizing are independent is rejected (Pearson value of 7.68 and observed significance level 0.0056) justifying a claim that BPR is usually correlated to downsizing. These initiatives involved various changes that are depicted in Figure 4.2. A considerable number, 70 respondents (68%), noted that they had delegated managerial decision making responsibilities to lower level staff.
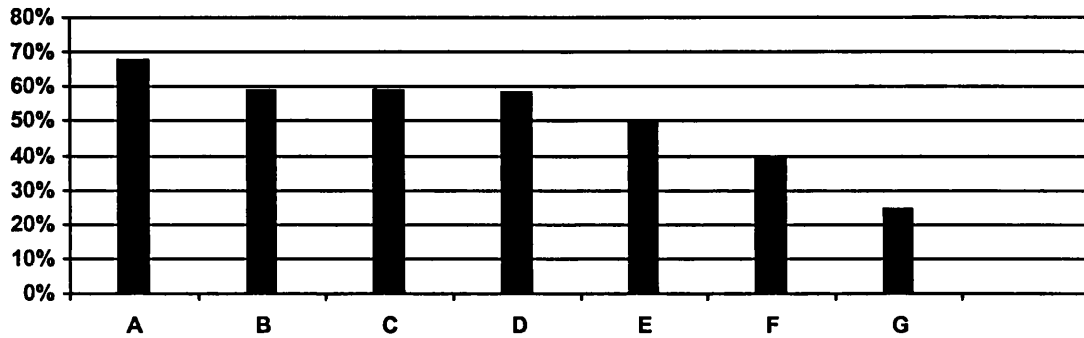
Figure 4.2: Changes in the organisation of work

where:

A= delegation of managerial decision making responsibilities
B= organisational restructuring based on business processes
C= integration of indirect with direct work
D= set-up of autonomous or semi-autonomous teams
E= task reorganisation based on whole, identifiable pieces of work
F= job enlargement
G= job rotation

Relating changes in work organisation to the types of major initiatives, we found that TQM is positively related to the formation of autonomous or semi-autonomous teams (Pearson chi-square value of 9.04 and observed significance level 0.00263), while downsizing is associated with the reorganisation of tasks based on whole, identifiable pieces of work (Pearson value of 9.489 and observed significance level 0.002) and is also correlated with job enlargement (Pearson value of 4.01 and observed significance level 0.045). This seems much as expected; as employees and managers leave, the remaining employees need to take over their responsibilities. Similarly, in accordance with the literature, BPR is also correlated with the restructuring of the organisation based on business processes (Pearson value of 13.336 and observed significance level 0.00026), and with the reorganisation of tasks based on whole, identifiable pieces of work (Pearson value of 5.305 and observed significance level 0.0212).

The reorganisation of tasks based on whole, identifiable pieces of work (Pearson value of 10.58 and observed significance level 0.0011), and the delegation of decision making responsibilities to lower level staff (Pearson value of 4.564 and observed significance level 0.0326), were found as likely consequences of delayering. The above merely confirm that the

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characteristics of the popular change initiatives reported in the academic and business literature, are also reflected in British manufacturing companies. The mean age of the change initiatives adopted is 4 years with a standard deviation equal to 2.41.

Figure 4.3 shows the respondents' ranking of the reasons for the introduction of the change initiatives (of a total of 91 companies that have adopted changes, 100%=91).
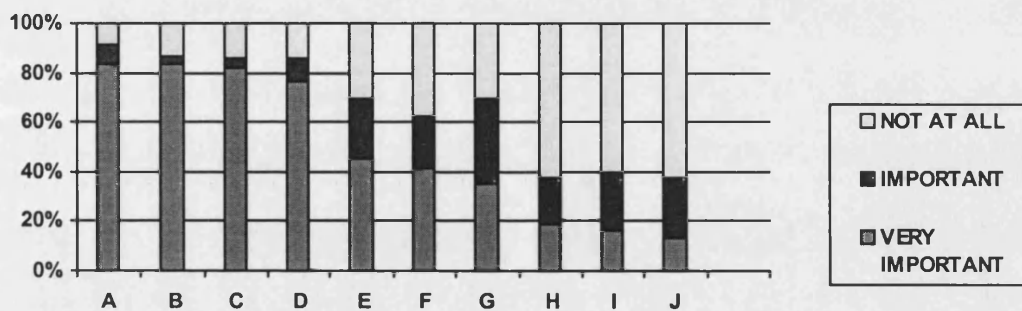
Figure 4.3: Reasons for the introduction of a change initiative

where:
        A= to improve quality
        B= to increase productivity
        C= to increase flexibility
        D= to reduce costs
        E= to increase staff commitment to company goals
        F= to improve employee skills
        G= to improve employee job satisfaction and motivation
        H= due to the introduction of advanced manufacturing technologies
        I= to take advantage of new information technologies
        J= to increase worker autonomy

There was no significant relationship observed between the type of change initiative and the reasons for its introduction. We could therefore reasonably assume that the most important concerns (quality, productivity, flexibility, cost reduction) are common to all change initiatives. In 68 of the 91 companies (74.7%) that adopted a change initiative, layers of management were removed as part of the change. Regarding empowerment, in 79 companies out of the 91 (86.8%), the change initiative resulted in some employee empowerment. From the 12 companies where their change initiative did not result in any employee empowerment, 3 claimed that the company is already sufficiently decentralised and 3 noted that although they wanted to, their initiative did not succeed in increasing employee empowerment. The most

important constraint in the introduction and operation of empowerment according to these 12 companies is organisational culture (57.1%).

In the 79 companies where some employee empowerment took place, empowerment does not seem to be related to the type or the age of the change initiative. This might suggest that empowerment does not come about with time; either the change will bring about an element of empowerment when it is implemented or it will not. On the contrary, whether the change will result in empowerment or not does seem to be associated with the reasons for its introduction; the change is more likely to result in empowerment if:

- the desire to improve employee job satisfaction and motivation was one of the reasons for change (the hypothesis that they are independent is rejected with a Pearson value of 8.509 and observed significance level 0.014)

- it involves the delegation of managerial decision making responsibilities (Pearson=9.48 and significance=0.002), or

- it involves job enlargement (Pearson=4.659 and significance=0.03) or job rotation (Pearson=5.325 and significance=0.021)

This is not surprising as additional decision making responsibilities can be delegated to an individual either directly from the top or from the integration of indirect tasks (such as planning and control) - that are usually carried out by different units - to his/her operational tasks. It is interesting that from the respondents that noted that their change initiative involved delegation of decision making responsibility, almost all (except 5) said that the change resulted in empowerment. Therefore in a sense this provides justification to our initial definition of empowerment as essentially *'delegation of decision making responsibilities'*.

4.1.2 Employee empowerment

This section continues the analysis based on the 79 companies where the change initiative resulted in empowerment. Of those, 77.2% reported that their senior management were mostly responsible for the introduction of

empowerment, while 54.4% identified their CEO as the agent primarily responsible for empowerment (the question permitted multiple responses). The largest changes in employee responsibilities concern quality responsibilities and problem solving and/or improvements as we see from the following chart:
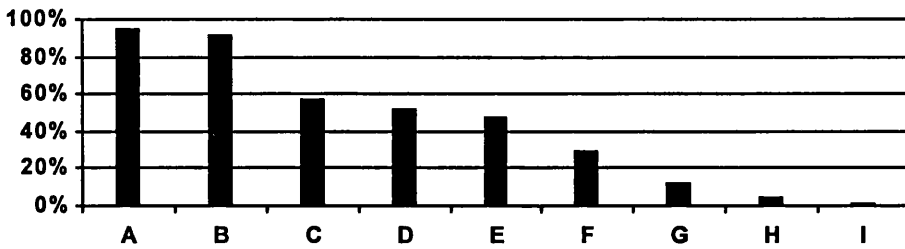
Figure 4.4: Changes in employee responsibilities

where:

A= improvements, problem solving
B= quality responsibilities
C= planning and scheduling of their work
D= equipment maintenance and repair
E= sharing of team leadership responsibilities
F= supplier and external customer management
G= product modification and development decisions
H= no change in responsibilities
I= hiring and firing personnel decisions

With 94.9% noting that employees now look for improvements and solve problems and 91.14% noting additional quality responsibilities, we can see that, for the vast majority of companies, empowerment in practice signifies the encouragement of their employees to look for improvements and solve problems. The most common examples of delegated decisions are the allocation of persons to jobs and shifts (32.4%), quality control responsibilities (27.9%), production and maintenance scheduling (25%) and plant modifications and/or improvements (25%). The impact of empowerment is quite widespread; 71.8% note that people (skills, job satisfaction, etc.) were most affected, 65.4% note the culture of the organisation, while 56.4% note tasks and procedures and 43.6% note the structure as being most affected by empowerment.

Regarding the success of empowerment, Figure 4.5 demonstrates the distribution of the subjective rankings (0-10 with 10 as "very successful") that

respondents gave to the success of empowerment in their company (17.7% of respondents noted that it was too soon to tell or that data was unavailable).
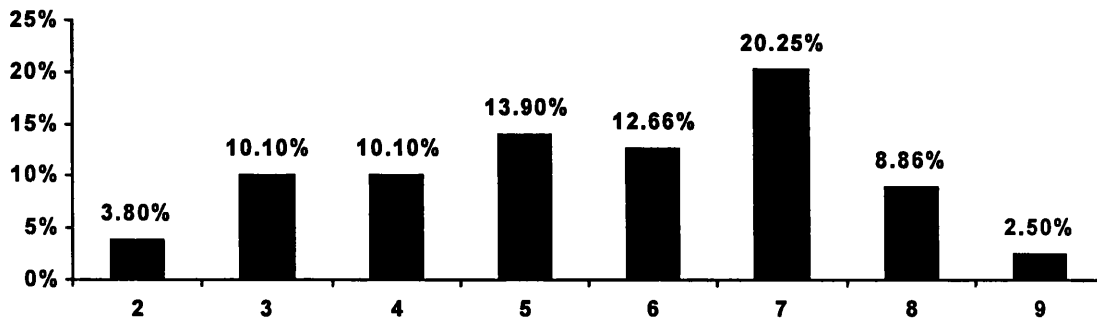
Figure 4.5: Empowerment success

Assuming that rankings 0-4 reflect a rather unsuccessful implementation while rankings between 5-9 reflect a successful one, in 24.1% of the 79 companies empowerment is seen as unsuccessful, in 58.2% it is successful, while 17.7% felt that it was too soon to tell or that data was unavailable. We attempted to trace factors that might be critical for success. There is no significant relationship between age of the change initiative and empowerment success. Although the statistical association between type of initiative and success of empowerment was not statistically significant, we observed that BPR and downsizing are characterised by more successful results than the overall average (ratio of unsuccessful to successful implementations is 0.34 in BPR and 0.31 in downsizing initiatives compared to a 0.41 overall average), whereas delayering demonstrates less success (ratio of 0.5). Empowerment success was found to be related to job enlargement (Pearson=4.624 and significance=0.03) and job rotation (Pearson=4.508 and significance=0.03). Figure 4.6 demonstrates the factors that influence the successful outcome of empowerment.
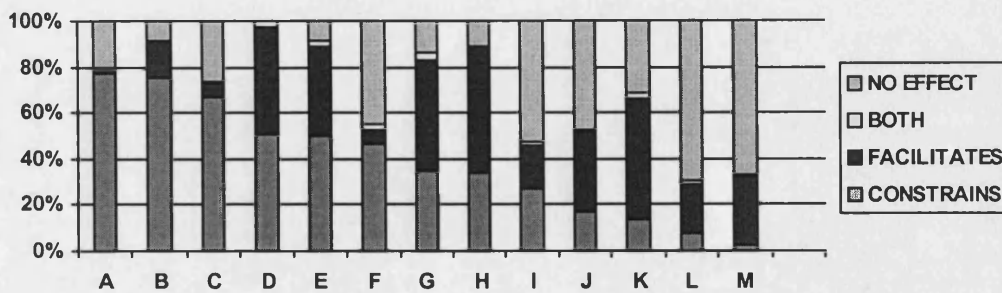
Figure 4.6: Factors affecting empowerment success

where:

    A= traditional division of tasks
    B= hierarchical management structure
    C= status and skills demarcation
    D= organisational culture
    E= middle management
    F= complexity and rigidity of the production system
    G= decision-making capability of staff
    H= employee skills
    I= trade unions
    J= high investment in existing production technology
    K= computer-based information systems
    L= short work cycle
    M= highly automated production system

The most common constraints are: the traditional division of tasks (76.7%), the hierarchical management structure (75.3%), the demarcation of status and skills (67.1%), the organisational culture (50.7%), middle management (50%) and the complexity and rigidity of the production system (46.3%). However, the culture and middle management are also ranked as important facilitators (46.7% and 38.9% respectively). Employee skills are the most common facilitator (54.8%). It is interesting to see that 52.7% of respondents regard computer-based information systems as facilitating empowerment while only 13.5% see them as constraints. The decision making capability of staff (48%) is also noted as facilitating the success of empowerment. The same results appear when we focus on the responses of companies that have adopted some specific change initiative. For BPR and TQM the most important constraints and facilitators are the same as in the overall distribution.

4.1.3 Information systems in empowerment

As expected, the main use of IS in manufacturing environments is for the control of production operations. 35 of the 79 respondents (44.3%) ranked

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this as the most important use that employees make of information systems (placing a value of 1 with a range of rankings from 1 to 7). However, if we use a broader ranking scheme and include rankings 1-3 as important, we see that 68.3% of respondents note that employees mostly use IS to access and analyse data.
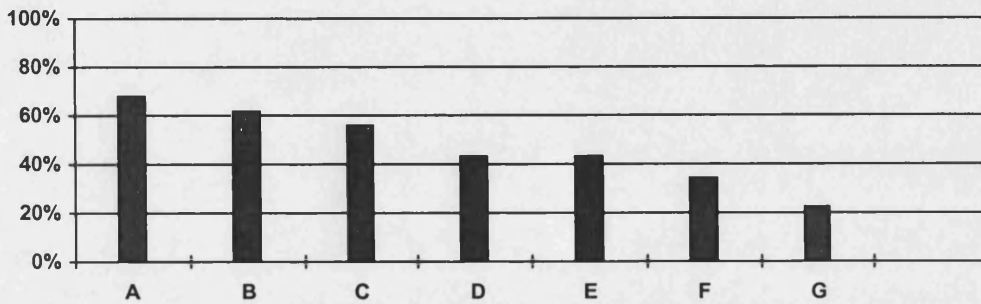
Figure 4.7: Uses of information systems

where:
      A= to access and analyse data
      B= to control production operations
      C= to support work tasks and procedures
      D= to facilitate internal and external communication
      E= to support decision making
      F= to exchange information on current processes and operations
      G= to report their actions and decisions to management

Figure 4.8 describes the distribution of responses regarding the factors that cause problems in the way empowered employees use IS.
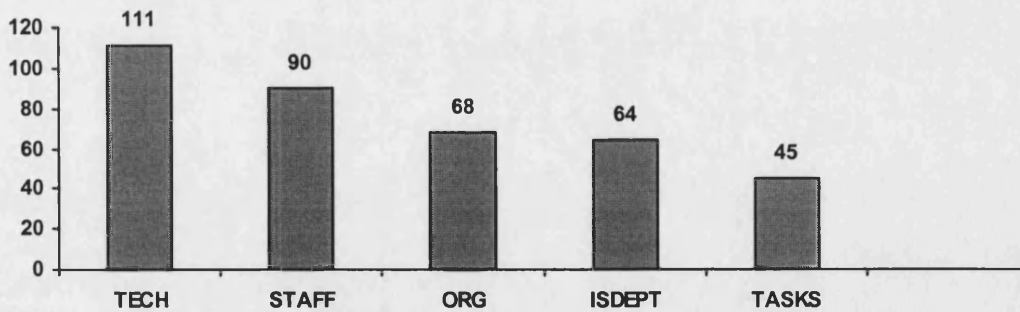
Figure 4.8: Factors negatively affecting the use of information systems in empowerment

where:
      Tech   = IS Technology (inadequate, unfriendly, too rigid, expensive)
      Staff   = IS skills, access to IS, motivation
      Org   = organisational culture, structure or strategy
      IS Dept= IS department's culture, structure or strategy
      Tasks = inappropriate, too complex, too simple tasks

Technical issues appear as the most important negative factor in the use of information systems with a total of 111 responses noting various aspects of

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the technology. However, the highest single factor is the IS skills of staff noted by 47 respondents. The distribution of these factors does not change significantly when we consider the specific types of change initiatives (e.g. BPR, TQM). However, organisational factors are more likely to cause problems in companies that have downsized (Pearson=4.038 and significance=0.04), and in companies that have adopted BPR or TQM, the problem of staff skills is accentuated.

In spite of these problems, respondents feel that information systems can be valuable for the successful operation of empowerment. 53.8% believe that information systems can provide major support, 41% believe that information systems can provide minor support while only 5.1% noted that information systems cannot support empowerment. These perceptions seem unrelated to the uses that empowered employees make of the systems in their companies. We cross-tabulated the main constraints with the perceptions of the usefulness of IS for empowerment and the independence hypothesis was rejected only for the IS technology variable (Pearson=7.322 and significance=0.02). This suggests that the respondents' perceptions of the value that IS hold for empowerment are related to whether the company has experienced problems with the technology.

Many companies (63.3%) have experienced changes in their information systems. Figure 4.9 shows the distribution of companies that proceeded to change their information systems against the age of their change initiative:
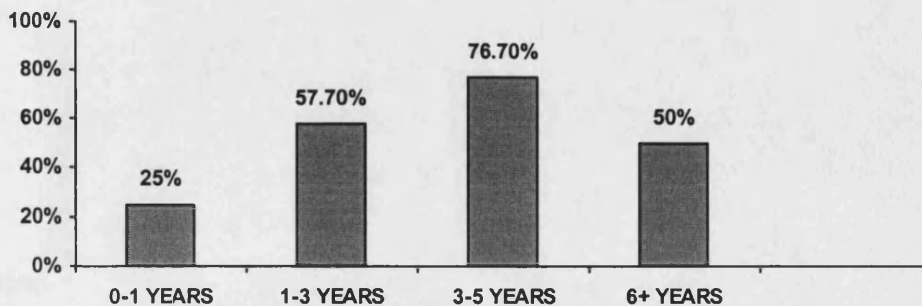
Figure 4.9: Distribution of companies that proceeded to change their IS based on the age of their change initiative

Companies that first introduced their change initiatives three to five years previously are most likely to have proceeded to changes in their information systems. It appears that companies that introduced their change initiative before 1991 do not seem to have necessitated changes in their information systems. From our subsequent interviews we found out that the initiatives introduced before 1991 involved essentially TQM practices where the role of IS is not so fundamental. Furthermore, whether or not any changes took place seems to be associated with:

- employees using information systems for decision making (Pearson=6.144 and significance=0.046).

- companies experiencing problems with the technology in the use of IS in empowerment (Pearson=5.975 and significance=0.0145).

- staff IS skills acting as a negative factor in the use of IS (Pearson=6.239 and significance=0.012).

These changes involved various aspects of the systems, as shown in Figure 4.10:
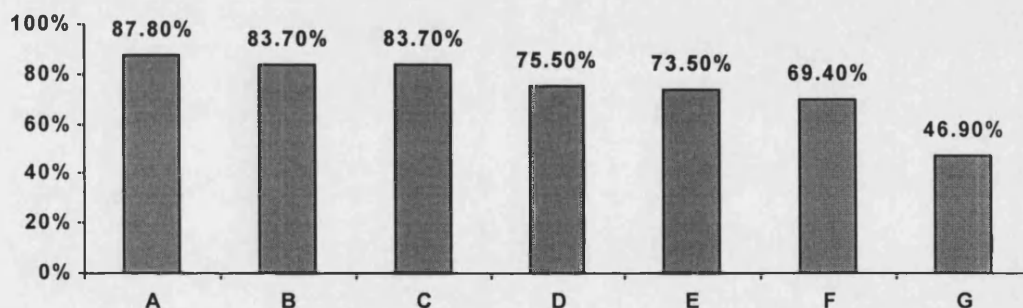
Figure 4.10: Changes in information systems

where:
>   A= access that employees have to the existing systems
>   B= additional training for the use of existing systems
>   C= introduction of new systems or new capabilities
>   D= uses that employees make of the systems in relation to their tasks
>   E= information content of the existing systems
>   F= structure of the existing information systems
>   G= IS design, development and management procedures

Therefore most companies increased employee access to the systems, provided additional training and introduced new systems. We attempted to see whether particular change initiatives necessitated specific changes, but the specific changes carried out were not related to any type of change

initiative. However, whether companies carried out changes in their IS design, development and management procedures is related to whether they experienced their IS department as a negative factor in their use of IS (Pearson=6.269 and significance=0.0122). Also changes in the uses that employees make of the systems seem to be associated with staff skills negatively affecting IS use (Pearson=11.649 and significance=0.0006).

These changes have been initiated mostly by senior management (35%), a joint business/IT team was responsible in 18.6% of the cases while line management was responsible for initiating the changes in 16.3% of cases.

4.1.4 Interpretive analysis of respondents' comments

Many returned questionnaires contained responses to the invitations to comment or to the open-ended questions (9, 15, 16, 20). Thus it was felt that these comments could provide valuable additional insights and they were analysed further using a qualitative approach similar to the one used by Markus (1994). The comments were fully transcribed and grouped according to research question (e.g. which aspect of empowerment can IS support?) and provide an additional rich source of data. The comments were analysed both qualitatively and quantitatively; in the qualitative analysis particular attention was paid to precise wording. For example, a comment such as IS can have a major impact on "process knowledge" was not interpreted the same as "process control" and was rather categorised as referring more to individual benefits and support. In this section we present some general quantitative results of the analysis of the comments while the precise comments are included in Section 4.2, related to the research issue that they pertain to.

We consider the respondents' comments for questions 15 and 16 as complementary since they both refer to the way in which information systems can support empowerment (see Appendix 1). Tables 4.2 and 4.3 present the most often-noted comments to questions 15 and 16 and question 20. A

comprehensive qualitative analysis of the comments is presented in section 4.2 with the related data from the interviews.

Support function	No. of responses
Information, data for decision making	32
Access/provision/distribution of information (appropriate, timely, etc.)	15
Data for operational activities (speed of response, material control, etc.)	10
Benefits for individual (knowledge, understanding, insight, skills development, task ownership)	10
Communication	9
Process control	4

Table 4.2: Main support functions of IS in empowerment

Steps to be taken to enhance IS support for empowerment	No. of responses
Make IS more user-friendly and flexible	17
More and better training	15
A better 'fit' between various aspects of IS development and management practices and business priorities	11
Greater access at all levels	7
System standardisation /integration	4
Faster development cycle, control of development to users, further requirements analysis	4

Table 4.3: Most frequently noted suggestions for a better IS support for empowerment

4.1.5 Summary

It is very interesting to observe from our sample the extent to which organisations are introducing change initiatives (88.3%) in order to improve their organisation of work. They are led by concerns for quality, productivity, flexibility and cost reduction. The popularity of approaches such as BPR and TQM is certainly substantiated by our results. Undoubtedly though there are two elements of bias that need to be noted (Moser and Kalton 1972): firstly the survey addressed large organisations that are more likely to introduce such change initiatives, and secondly the non-respondent bias means that the non-respondents are probably companies that have not introduced any change initiative and their inclusion would have affected the overall results.

Organisations often seem to adopt a combination of approaches with a combination of results. The change resulted in employee empowerment in

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86.8% of organisations that proceeded to change initiatives, especially when it involved the formation of teams, the delegation of managerial decision-making responsibilities, job enlargement or job rotation. Empowerment usually has quite a widespread effect on the organisational characteristics but mostly affects employee skills and responsibilities; employees mainly assume quality responsibilities, look for improvements and solve problems.

Companies claim to be fairly successful in their empowerment efforts, particularly if these are within a BPR or downsizing initiative. This is despite the mediation of considerable constraints - the traditional division of tasks, the hierarchical structure and culture and the demarcation of status and skills are all noted as major constraints. Information systems are seen as a valuable tool for empowered employees; 53.8% of respondents believe that IS can provide major support for empowerment by facilitating data access and analysis, the control of production operations and everyday work tasks and procedures. Nevertheless employees face difficulties in their use of IS; most are due to the technological elements of the systems while the lack of adequate IS skills also appears very important. Although many companies (63.3%) have proceeded to change various aspects of their IS, there are still significant obstacles that call for:

- the need to make IS more user-friendly and flexible
- more and better training
- a better 'fit' between various aspects of IS development and management practices and business priorities
- greater access at all levels
- system standardisation /integration
- faster development cycle, control of development to users, further requirements analysis

These suggestions essentially reflect the problems that employees are facing with the use of IS in support of empowerment.

The survey provides valuable data on the current situation regarding empowerment (where and why it is introduced, what it means, its extent, etc.).

However, as noted in Chapter 3, the survey approach is limited in practice; it provides a lot of data but allows little insight into the background of events, and is also very poor in providing supplementary data that can sketch out the whole picture. That is why we proceeded to the interviews to elucidate the context and process and provide additional information on the issues addressed in the survey.

4.2 Series of in-depth interviews

The survey complemented the literature review and revealed a broad range of approaches to empowerment. Nevertheless, as expected, the results failed to provide adequate 'contextual' data to explain the entire organisational situation. We only caught a glimpse of these variations through the comments of respondents (see Section 4.1.4). Thus in order to be able to derive some meaningful conclusions we need to look at individual cases and understand both the specific organisational context but also the work practices that each particular promotion of empowerment creates.

4.2.1 Overview - company background information

Table 4.4 presents an overview of the companies that were interviewed. As noted above, a number of criteria were used for case selection. We deliberately sought to speak to long-established companies in order to uncover the full range of difficulties that emerge with the encouragement of empowerment and with IS support in the new context. The situation is likely to be different in newer, less established companies. Thus the companies selected are all going through changes in their work practices, although not necessarily as a result of a formal, intentional change programme (as we discuss further, in many cases empowerment has a more evolutionary character). Furthermore the selected companies have varying budgets and extent of involvement in IT. Six out of the eighteen companies that participated in the research fall within the 100 companies with the biggest IT expenditure in the UK (Computing/Spikes Cavell 1997; see Appendix 2). A list with interview details is also presented in Appendix 2.

Company	Annual turnover (£ millions)	No. of manuf. sites in the UK	No. of employees (UK)	Main product lines
Amersham International Plc.	350	2	3500 (w/w)	health science
Blue Circle Cement	370	11	2200	building materials
Kraft Jacobs Suchard Ltd.	590	4	2800	FMCG
Rank Xerox Ltd.	800	1	2000	electronics
Caradon MK Electric Ltd.	300	3	2000	electrical products; engin. materials
Ford Motor Co. Ltd.	6000	4	~30000	automotive
Rolls-Royce Plc.-Aerospace Group	3000	1+	20000	aerospace
Vauxhall Motors Ltd. (Luton and Ellesmere Port)	4100	2	8500	automotive
Leyland Trucks Ltd.	180	1	724	commercial vehicles
Unilever Plc.	9000	50+	22000	FMCG, chemicals, detergents
BICC Cables	1300	20	10800 (w/w)	cables
Walkers Snack Foods Ltd.	470	3+	4300	FMCG
Rolls-Royce Motor Cars Ltd.	N/A	1	2500	automotive
Rover Group Ltd.	4000	3+	39000	automotive
Parker Hannifin Corp.	80	10	1500	engineering components
Esso UK Plc.	3600	3+	3900	oil
Glaxo Wellcome Operations	5600	7	7500	pharmaceuticals

Table 4.4: Overview of companies interviewed

4.2.2 Presentation of findings on empowerment

In the following sections we present and discuss the interview findings, roughly following the structure of the questionnaire and the interviews. The relevant comments of survey respondents are integrated with the issues surfacing in the interviews, and are presented in a table at the start of each section.

4.2.2.1 Change initiatives and empowerment

For most of the manufacturing companies that participated in the research empowerment came about as a part or result of some business change programme such as BPR, TQM, downsizing or delayering. We examine how empowerment is perceived within each initiative in order to present more fully the whole range of different approaches.

Total quality management, continuous improvement and empowerment

Continuous improvement has been adopted by quite a few companies (throughout the rest of this chapter our generalisations refer solely to the 18 companies we interviewed). Although it is related to the total quality philosophy, the way most companies approach it seems to focus more on continually improving one's work, one's performance and the surrounding processes. Continuous improvement was driven in two companies by an increase in the rate of change required within the organisation in response to the increased rate of change in the external environment. In such a case the employees that are being asked to continually change and improve practices, need to feel at least some ownership of the change; thus it has to come from them.

The empowerment philosophy is proclaimed as an inherent part of continuous improvement as employees have to feel responsible and accountable for the work that they do, in order to strive to do it better. In contrast to the Taylorist model of work organisation where somebody else decided what the best way to perform a task was, now employees are seen as the ones that know their roles best and are asked to suggest new ways and means of performing this task.

> "I think empowerment to [this company] is actually giving employees flexibility and the room to manoeuvre, to actually do their job and to do their job to a high standard. It's about providing them with the right training, providing them with the right skills and the right tools to actually look at their job and see how they're doing their job, and are they doing their job in the best way. And giving them scope to actually make decisions and have some impact on what they're doing" (Personnel Manager, FMCG manufacturer).

Thus it seems that the impact that employees can have is bounded by the definition of one's job. This was made clearer by another 'version' of continuous improvement which compromises on employee discretion:

> "[...] lots and lots of little steps by empowered individuals. But that doesn't mean to say that everybody can do what they like. You've got to have a process to say yes, this is a good idea, and you put it in, in a way that enables you to control the changes" (Personnel Manager, car manufacturer).

The process that controls the incremental changes for improvements in most cases is either teamwork or suggestion schemes.

Continuous improvement seems to be focused on individual and team training. Its main ideas tend to place emphasis on managers who have to cultivate and support the empowerment of their employees. Total quality and continuous improvement are found to 'work better' in some areas than others. For example, in traditional production lines workers do not really have any 'space' to make decisions or think about how to do things as the line keeps rolling:

"So around TQM we built concepts of cell teams in assembly areas, which is actually quite difficult in car assembly because an assembly line is a long beast and in effect the assembly line drives the work, it is actually very difficult for a local, small group within that line to make significant differences to their work performance. They can do their job more efficiently and with better quality; all it really does is that it means that they have slightly more time" (IT Strategy Manager, car manufacturer).

Although the emphasis on quality and continuous improvement is dependent on employees developing a sense of ownership for their job and responsibilities, in everyday operation it seems that employee decision making ability and involvement in broader issues is limited. Still this does depend on the way the change is handled. In one company employees were given the opportunity to get actively involved in broader issues and affect operations on such a level that would have never been previously possible:

"a group of operators put together a capital approval request, and then presented that to the vice-president for Operations. So, rather than that being a management task, there are groups of operators around the business who've acquired those skills and have stood up in front of a couple of hundred of their colleagues, presented a business case for improvement, and secured capital investment approval" (HR manager, FMCG manufacturer).

Downsizing, delayering and empowerment

In many companies empowerment has come as a result of downsizing and delayering and improved efficiencies. With less managers and employees on site, the remaining people have to take on more responsibilities:

"if you took this site's finance, certain aspects of the accounts are done in their entirety by people that used to have to check with the accountants before they did the work" (Personnel Manager, electrical products).

"Before these redundancies there were seven layers of management. [...] From the shopfloor, through the leading hands, the charge hands, foremen and all that sort of thing, all the way up to the manager, there were seven levels. Now there's just two. [...] So there's short reporting lines and obviously a lot of empowerment on the shop-floor" (Personnel Manager, electrical products).

However not every downsizing and delayering results in employee empowerment. In this type of change initiative the particular financial situation of the company is important for the way empowerment operates: if a company is intentionally embarking on a change programme to make operations more effective and efficient and empowerment is seen as a deliberate choice, then empowerment is likely to be more successful than in cases where the company is less 'in control' and downsizing is an inevitable result of financial pressures. For example a conscious approach to empowerment within a strong financial situation pays considerable attention to employee training and mobilisation:

"if we're going to run businesses with shallow hierarchies, relatively few people, then those few people need to be highly-skilled, well-trained, well-motivated and thoroughly involved in the business. And so we've deliberately set out to, to deal with those things" (National Manager, FMCG manufacturer).

In stark contrast to the above, in a company that had to resort to downsizing and is still continuing redundancies, employees' attitudes are understandably negative:

"[...] morale is, I wouldn't say it's completely demoralised but it's pretty quiet at the moment, pretty low. There's a lot of people working here who know they're going to be made redundant during the course of the next year. [...] I think it [empowerment] has been forced upon people actually" (Personnel Manager, electrical products).

Downsizing and delayering appear to create difficult contexts for empowerment, particularly regarding the way "survivors" respond to the change (Mishra and Spreitzer 1998).

Teamworking and empowerment

In teamworking, empowerment essentially comes as a result of breaking down job demarcation barriers and self-management which seem to characterise most teamworking arrangements (Neumann, Holti et al. 1995). For example, employees receive the manufacturing schedule and have the discretion to decide how and when to do the work.

One of the companies has developed a very comprehensive approach to empowerment through self-managed work groups. A corporate wide initiative was spread at the time of the research throughout the site; from four initial

pilot teams, another seven teams were engaged. For this company empowerment is:

> "it's about ownership of everything that affects you in meeting your customer's requirements. So whatever it takes for you to deliver your outputs you should have direct ownership of, as far as possible.[...] So it's a growing process, a process where we get the decision making at the right level, the level that can actually affect the outputs" (HR Manager, electronics manufacturer).

Employees engage in the self-managed teams, called x-teams, voluntarily and the initiative is not 'forced upon them'. The setting up of a new business in a new building on site, presented an opportunity for teams to determine totally their work. The 30 to 40 production operators with one manager that were going to run the business were given the business requirements and they decided how they wanted to go about it. They designed their own shopfloor areas, their work organisation, they decide their own workloads in terms of schedules and shifts, overnight, weekend work and have dramatic decision-making freedom compared to other more traditional operational areas.

The setting up of the new business created a unique opportunity though. It is not so easy in other established parts of the business. The move towards self-managed teams cannot be isolated to only some elements of the organisation and has repercussions throughout the company. In the established parts of the business, training content has been affected to embrace issues like the empowerment culture and the new work environment. The need to reflect empowerment made managers rethink the certification procedure:

> "and we have had a process in the past where we've assessed that person to say they are competent. When you bring in empowerment you start saying "now what are the values of empowerment, who owns empowerment?" All of a sudden you've got something which is actually internally owned by individuals. Is that in keeping with the system where in fact you're judging them from the outside? "well perhaps no, if we really mean empowerment we shouldn't be assessing from outside we should be allowing the individuals to self-assess and see what the requirements are of them [...] but they actually make the assessment of whether they're there or not, because they own it" (HR Manager, electronics manufacturer).

Deeper changes however also became necessary in organisational structure: in one particular business centre they introduced a series of x-teams at shopfloor level. This meant that the business centre was left with a functional organisation at the top, the management hierarchy which was structurally

incompatible with the rest of the business centre. In order to harmonise the organisational structure the group of managers at the top is now becoming an x-team too.

Business process re-engineering and empowerment

Within BPR empowerment is seen as pushing decision making down the organisation and employees taking ownership of the part of the process they are involved in. This is essential to improve and streamline business processes:

> "Now the re-engineering or change programmes necessitate empowerment in order to get efficiencies and speed of reaction" (IT Manager, pharmaceuticals manufacturer).

The issue of speed of reaction and flexibility to the market was what drove a large car manufacturer to redesign the order process. As they decided to make directly to order and not to stock at their dealers, they discovered that they could not have a stable production plan in detail, since they could not know what the customer is going to order.

> "So you have to be very responsive all the way through the process and you can't do that centrally. You actually need to have people in the business empowered to take local decisions about local needs to get that flexibility. So you're moving away from heavily centralised planning to distributed decision making" (IT Strategy Manager, car manufacturer).

In most car assembly lines at the moment, the centralised scheduling sequence means that cars and their contents are determined at the starting point in the line and workers do not have to make any decisions regarding what to put in the car. In order to reduce delivery time to the customer, car companies are aiming to be able to launch a car down the line without being absolutely sure about its content. Thus although for example, a sunroof has to be determined at the outset since it is part of the body, decisions regarding accessories could be made sometime between the launching point and the last station on the assembly line. Operators would then for example have to decide which radio to fit based on the customer order, on the assumption that the specific radio will be delivered to the line. As uncertainty and flexibility impact suppliers too, operators need to make all the necessary decisions in case the radio is not there on time. These new issues introduce significant

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decision making to the production lines and are not characteristic of the car industry solely but are relevant to other industries as well.

Organisation-specific reasons and rationale

Apart from the cases where larger change initiatives were introduced, it is worthwhile noting instances where empowerment came as a result of other, more specific circumstances. These often seem to involve severe crises where the threat to the company acts as a trigger for change. In a car manufacturing plant, a new employee agreement was required to deal with the very poor industrial relations that had plagued the site in the 1970s and 1980s. As a result of this, the site (a part of General Motors) was not allowed to bid for any new work or investment from the mother company.

> "And then in 1989 we were given a challenge by General Motors in Europe that we could bid for a new engine shop which we have now got, as long as we came up with a new employee agreement" (Personnel Manager, car manufacturer).

The new investment was critical for the survival of the plant and an agreement was negotiated with the trade union. The new employee agreement introduced team working and employee involvement ideas for the first time. These were the first steps in an unintentional process that has culminated in considerable empowerment for the workforce:

> "maybe we didn't completely understand what we were doing ourselves, to be quite honest, as regards empowering people, and how it would open the door to the involvement of the employees" (Personnel Manager, car manufacturer).

The process was very difficult initially:

> "we were talking about, at that time, being here for 25, 26 years and have to try and turn over existing employees, who we'd ignored. So to start they weren't very impressed about teams and thought that nothing would change. But gradually it has done" (Personnel Manager, car manufacturer).

The change process over the last 8 years dramatically improved the plant's performance such that GM can now rely on this plant for engines for cars that are built elsewhere in Europe and the States:

> "and each of the assembly plants in Europe rely on this plant for something, whether it's sheet metal that we transfer over there or mechanical components. So, a plant that General Motors just made sure that nobody relied on, is strategically now very important, and virtually everybody relies on us for something. And it's all started with our agreement" (Personnel Manager, car manufacturer).

The changes in work practices include the introduction of teamwork, with team leaders that were hourly-paid employees, the removal of levels of supervision, and the delegation of the traditional supervisor responsibilities to teams. What seems to have successfully triggered the change in employee attitudes though were the difficult conditions that the plant is facing. This is a company that is characterised by severe internal competition and even very recently, in April 1998 a new employee agreement had to be signed to ensure that factories in the UK would not be closed in the short-term (Jones 1998; Lorenz 1998).

"I would say that the individual employees are very aware of the competitive pressures in the industry. There was a time when they weren't, or they just thought it was management propaganda" (Personnel Manager, car manufacturer).

To conclude, manufacturing companies adopt various approaches to empowerment: the introduction of change initiatives such as BPR, continuous improvement and teamwork usually involves a more 'deliberate' empowerment element. Downsizing and delayering can either promote empowerment intentionally, mostly in cases where the changes take place within a healthy financial situation or result in empowerment unintentionally in cases of financial hardship. Apart from the cases where a rather 'conscious', coordinated promotion of empowerment took place, in some other companies empowerment has a much more unintentional and 'emergent' character. This character mostly stems from specific structural and procedural factors (e.g. a decentralised organisational structure, autonomous business units, etc.).

"Nobody specifically set out to introduce empowerment. Empowerment has happened usually where you've got some better managers who have taken the opportunity whatever changes have come in, to create that and have got payback because of the empowered staff. So the opportunities are probably open to far more managers than those that have actually made it happen, but there hasn't been if you like a coordinated campaign to introduce empowerment" (Personnel Manager, aerospace company).

The results in these cases are varied and in general we would be sceptical of such circumstances as involving minimal advances. However in some instances the necessary factors can come into play to produce remarkable empowerment.

For companies that had introduced more than one change initiative, initiatives were found in some cases to be completely separate, while in some others, changes were a result of a coordinated business review which attempts to improve business performance. Also the approaches to the introduction of empowerment do indeed vary: while some companies used a top-down formal introduction that ensured senior management commitment, others dismiss the introduction of formal change programmes as ineffective.

"It is always most successful if it comes from the divisional managers [bottom-up]" (IT Manager, engineering company),

whereas in another company:

"there was certainly no formal programme that launched anything. My experience is those things are not sustainable, are seen as gimmicks, so there was effectively a very slow kick off to this process" (HR Manager, FMCG manufacturer).

"We found that labeling can be disastrous. Giving things titles, can really give misunderstandings, because if there is any bad press about that title anywhere then it could be picked up and people can misunderstand it" (HR Manager, electronics manufacturer).

These findings are consistent with the debate in the empowerment literature (see e.g. Foster-Fishman and Keys 1997 versus the results of Kanter 1984 and Fenton-O'Creevy 1998).

4.2.2.2 Changes in work practices of lower level employees

Although the different change initiatives tend to give a slightly different 'twist' to the meaning of empowerment, in essence they involve the same basic principles: employees usually have broader tasks and responsibilities, they have more control over their work (how and when they do things) and they are called to continually try to improve the part of the process that they are involved with.

"But really the most constructive step was to get beyond the management levels in the organisation to the people who actually do the work, giving them much greater autonomy than they ever had in the past for influencing their own work environment [and] managing their own work processes" (HR Manager, health science company).

Employees' jobs have become significantly broader. They have moved from single, narrow tasks to multiple tasks and responsibilities which are linked to

broader business goals. In many respects, employees are much more responsible for managing themselves.

> "We don't really have foremen any longer in the old-fashioned sense. So there aren't hordes of people waiting to be told what to do, because if there's no one there to tell them, they just stop. And we used to have many situations like that" (National Manager, FMCG manufacturer).

In many companies, shopfloor employees are responsible for their own production, for obtaining their own parts and for reducing the amount of stock held. Team leaders have assumed tasks that were traditionally the responsibility of supervisors - like balancing the workload, replacing absent staff and ensuring team members understand the task for the day. Supervisors now tend to concentrate on planning issues, while quality responsibilities are delegated to team members and include self-inspection and problem solving activities.

In most cases, companies communicate the business vision and goals to employees and encourage them to drive quality, efficiency and cost improvements. Employees are nowadays much better informed about the business as a whole, in order to see where they can contribute.

Interesting changes were noted in work that in the past used to be done by salaried engineers that is now done by hourly-paid staff. In planning a new car model in one company, maintenance personnel get very closely involved with the equipment on the shopfloor. Those people - around 50 "coordinators" on one site - get involved at the planning stage of the new equipment, a couple of years in advance of a new model introduction. In this way, they can help with the original equipment manufacturers to design the equipment so it is easier to use or maintain.

> "We've got to the stage, that because they're so competent, you know, they are making decisions which in the past would have been made by quite senior engineers" (Personnel Manager, car manufacturer).

Thus the coordinators work with the company's suppliers and assume greater responsibilities:

> "so in the past there would have never been a time when an hourly-paid guy would represent [our company] with a supplier. But now if a coordinator is associated with a

particular piece of equipment, in the old days he would, the maintenance guy would communicate with his supervisor, the supervisor would communicate with the planning engineer, and the planning engineer may pay a visit to a supplier. And all the information was second and third-hand. And now we just feel comfortable with that particular hourly-paid girl, being our representative with the manufacturer, if it's to talk about a decision of new equipment" (Personnel Manager, car manufacturer).

All these additional responsibilities seem to make jobs much more interesting, but also put more pressure on employees. Naturally, extensive training is almost always required to help employees develop the appropriate skills.

4.2.2.3 Effects of empowerment on the organisation

One of the fundamental starting points of the research as it was initially formed was that the promotion of empowerment would probably affect other elements of the organisation than just employees' tasks and responsibilities (see Chapter 1). This expectation was indeed supported in most cases:

"Now that's where [empowerment] starts to drive you down into all sorts of other processes and activities, so the values of empowerment have to be pervasive, it actually cuts across everything. Once you engaged it, you have to review everything else in terms of what those values are" (HR Manager, electronics manufacturer).

Wherever organisational properties remain in the form they had prior to the introduction of empowerment, they are likely to constrain empowerment.

"But it's the boundary setting bit, they [teams] don't have total freedom. So if the managers or the people that are looking after the rest of the system aren't reviewing what that is like and what empowerment values mean for that, then you can actually end up with it in conflict" (HR Manager, electronics manufacturer).

In such cases empowerment will probably never become engrained in the organisation and runs the danger of remaining an add-on. The most successful adoptions of empowerment have entailed significant changes in all parts of the organisation:

"and when I say, change the whole way we worked, that meant changing pay systems, meant changing organisations, meant changing attitudes, and meant changing management style, it meant changing communication processes. It meant changing health and safety systems. It meant changing everything in the company. So it's a very, very dramatic change" (Personnel Director, commercial vehicle manufacturer).

However the interviews uncovered that although many survey respondents had noted that empowerment had affected organisation elements like structure, culture, etc., in fact these changes were due to the broader change initiative and could not be attributed solely to empowerment. In this section we

discuss the effects that the adoption of empowerment has had on the organisations - based on the respondents' views - but we do point to the difficulty in distinguishing between the general change initiative and empowerment and also the oversimplification of using a cause-and-effect relationship to describe such a complex social phenomenon.

Empowerment has in most cases affected organisational culture because empowerment demands a move from a fairly traditional culture where people are told their job description and responsibilities, to a culture where they are seen as the ones that know most about their job and are encouraged to think about what they are doing and how they could be changing things for the better. These moves affect both the belief systems regarding the organisation's core values and its patterns of desirable behaviour (Smithson and Psoinos 1997).

Empowerment affects the type of employees that companies now wish to hire:

> "I think in our recruitment procedure, we've changed our specification for people that we're looking to recruit" (Personnel Manager, FMCG manufacturer).

Empowerment also affects established procedures and aspects of organisational hierarchy: in many cases, some employees have been given authority to approve expenses up to a certain level and the budgeting procedure is amended accordingly.

> "If our base view is that people should have big jobs with lots of scope, lots of opportunity to manage their own situation, then clearly the structure in which we allocate accountabilities and responsibilities, the management structure needs to change to reflect that philosophy. So we have certainly altered our management structure" (HR Manager, FMCG manufacturer).

One company that introduced cell teams on the shopfloor had to thoroughly redesign their grading structures. The traditional assembly line was managed by one foreman and 25 equal people below him. The cells required smaller groups so another layer was introduced and the grading structure was modified. Also demarcation issues had to be dealt with:

> "so in fact trying to create the cell teams actually created a situation where a whole raft of things had to be moved around them" (IT Strategy Manager, car manufacturer).

In one plant of a food manufacturer all shopfloor employees are now salaried; no payments are made for overtime and the reward procedures were adjusted to support the empowerment philosophy.

4.2.2.4 Empowerment success and indicators

It is clear from the literature and our own data that the successful operation of empowerment necessitates many changes. However despite the far-reaching changes that some organisations engage in to complement empowerment ideas, the results are mixed. Employee responses vary and seem to depend on the individual (primarily regarding age and skills), the organisational situation (business growth, etc.) and more importantly on the way empowerment is promoted within the company:

> "I think employees, once they realise that this isn't actually a five-minute wonder, that actually we're talking about [...] the way we want our employees to operate, then people don't turn down the opportunity to actually put up suggestions about their job, or look at their job and how they want to change things" (Personnel Manager, FMCG manufacturer).

> "Some folks take to it incredibly well and some are really not that interested" (Personnel Manager, FMCG manufacturer).

Most manufacturing companies are characterised by an older employee profile and very low employee turnover. It is the norm for employees to be working for their company for 20, 30 years, which seems to act as a constraint for the success of empowerment.

But how do companies measure the 'success' of empowerment (Klose 1993)? Based on their response to the specific question in the questionnaire interviewees had ranked the success of empowerment in their company on a scale of zero to ten. When asked what sort of indicators or measures they take into account, most respondents quoted business performance measures, such as profits, sales, volumes, customer satisfaction, response times to customers and delivery levels. More detailed indicators such as the number of hours necessary to assemble a product, e.g. a car, the quality of the product, accuracy rates in terms of invoices sent out and so on, were also used. Although these do not precisely reveal a relationship between empowerment

and improved business performance measures, they do indirectly suggest good employee performance:

> "If you focus on quality [...] bearing in mind that a car has probably got 4,000 part numbers and the opportunity that there is of producing a bad-quality vehicle, you can't just get good quality built into a vehicle, just by telling people that you want good quality. You've got to get their understanding and support" (Personnel Manager, car manufacturer).

A number of more specific, employee-related measures such as absence and turnover rates are used to capture how people are reacting to empowerment. Investor In People (IIP) awards are frequently quoted as an indirect indicator of the company's commitment to the development in employee skills and tasks.

> "So it's not an accident that we now have in the UK 32 Investors in People Awards. It's no accident that most of our businesses now have had ISO 9000 quality awards for several years. The importance of those things to this topic [...], is that they all feed off each other. You can't become an Investor in People plant without involving everybody, making sure that the basic systems are working" (National Manager, FMCG manufacturer).

Other organisational changes imply that empowerment is progressing. Spans of control have increased dramatically; in one company:

> "we have section supervisors in some of our factories looking over a hundred people and they are the manager. Well there is no way they are going to operate in a controlled fashion like they might have done 5 or 6 years ago" (HR Manager, electronics manufacturer).

Similar changes are also visible in grading and job evaluation exercises:

> "I am responsible for grading and they'll come to me and they'll say this job has changed, this person's now doing this, they're now doing this, they're now doing this, and I'm thinking, my God this is where the job was six months ago, this is now what they're doing" (Personnel Manager, FMCG manufacturer).

"Softer" changes in employee attitudes are also used as an indicator:

> "one of the big changes that I've seen over the years, people used to say, well if you want me to do that, you'd better come along with your wallet, and we'll talk about it. Don't talk that way now. People are hungry to take on additional responsibility, hungry to do it. Why don't you ask me to?" (Personnel Manager, car manufacturer).

Employee attitude surveys were also quoted as demonstrating employees' attitudes towards the new work practices (Klose 1993). These become particularly valuable when they are repeatedly conducted over a long period of time.

Although the above factors are indicators they fail to pinpoint a clear relationship between empowerment and e.g. business results. Similarly the 'softer' indicators could be attributed to something other than empowerment. It is clear from our research that there are no solid indicators about the extent of empowerment or its success. In a company that has a long experience with empowerment our concerns became justified:

> "we don't have the measures to actually measure the extent of empowerment. [...] So I could put some surrogates in there to say because of these things we have some sort of measure, but really what we are after is behaving and action, aren't we?" (HR Manager, electronics manufacturer).

4.2.2.5 Empowerment success: facilitators and constraints

Based on their experience with empowerment, the interviewees noted various factors as facilitating or constraining empowerment. The most important constraints seem to revolve around two issues: the attitudes of managers and established hierarchies and procedures.

> "I think that one of the biggest problems of empowerment is senior management letting go [...] And if there was a criticism of management here, is that we have not sort of devolved enough, quickly enough" (IT Strategy Manager, car manufacturer).

Many companies noted that their managers at various levels posed significant difficulties either due to a failure of the company to guide them through to the new situation or due to their own personal reluctance to relinquish control:

> "particularly if you have too many layers of management sometimes you have managers acting down they were interfering and inhibiting; they weren't doing their job, they were doing their subordinate's job" (Personnel Manager, aerospace company).

> "The culture is the difficulty, the old, traditional culture on sites like this [...] and the role models of the managers need changing as well to meet the new needs of the business. They're affectionately known as 'blockers' within the First in Service culture" (Personnel Manager, electrical products manufacturer).

These findings are in agreement with the literature on empowerment (Eccles 1993; Fenton-O'Creevy 1998; Foster-Fishman 1997; Rothstein 1995).

> "I don't think we've sorted out for the middle managers really what their new role is and therefore I think traditional roles as opposed to new roles can get in the way" (HR Manager, electronics manufacturer).

However as noted above, in the company that had implemented the x-teams, the managers had also formed an x-team themselves to be better aligned to the series of x-teams on the shopfloor level.

> "Now all of a sudden with that group it starts to make sense that we're actually helping them deal with the very issues of threat, and they're being empowered to find that role that works" (HR Manager, electronics manufacturer).

The difficulties with managers are not simply relevant to the senior levels though; middle managers and supervisors are threatened by the institutionalisation of the team leader who appears to assume many of their traditional responsibilities:

> "one of the problems of course of focusing on the team leader is the change in the role of the supervisor. So some of the older supervisors, [...] feel under threat because part of their job that they used to do, is now taken over by the team leader. So we're trying to sort of balance the two" (Personnel Manager, car manufacturer).

The second major constraint that companies seem to face is the traditional structure of the organisation in terms of procedures and hierarchies:

> "we haven't really let go enough of some of these management controls, for empowerment to be as successful as it could be. [...] you can't really be as successful in terms of empowerment as you might wish if you've got a plethora of senior management controls layered on top of whatever sort of programmes you are trying to run, because people will still regard those as either a sanctioning process or a control process, something that limits their empowerment" (HR Manager, health science company).

Apart from the above, there are some other factors that can inhibit the successful operation of empowerment. A solid understanding of the business process and the tasks that are to be delegated is necessary if employees are to successfully assume responsibilities.

> "People don't have a good understanding of manufacturing and supply in this business, because it's been complicated over time. And so if you can strip that out and get it down to its basics, then you do make the essence of doing the job a lot simpler for individuals, which therefore makes the decisions they need to make easier and makes empowerment easier" (IT Manager, pharmaceutical manufacturer).

Also there are some other production-related aspects that can constrain the operation of empowerment. For example:

> "if you're talking about very tight time deadlines, you have short production cycles, short work cycles, then there's probably very little room to actually manoeuvre in terms of looking at how you do things differently. You're basically telling your staff, this is the way it's got to be done and you have no room for manoeuvre"(Personnel Manager, FMCG manufacturer).

Similarly the increasing need for standardisation of products, can pose constraints for employee discretion and empowerment:

> "You wouldn't want the person who comes in and makes it [the car] on first shift, to be doing it differently from the person who comes in and makes your friend's car on second shift, whatever that bit they do, you'd want it to be done the same" (Personnel Manager, car manufacturer).

To conclude, interviewees were asked to pinpoint some critical factors for the success of empowerment. Firstly, a clear link needs to be established between employees and the final customer; this seems to motivate employees and help them identify the complexities of the business process:

> "one of the differences was they [employees] have got control of the whole process; instead of being the bit at the end of the process which is being deluged with product coming in and getting product out, they actually were responsible for trying to keep the customers, satisfy the customers" (Personnel Manager, aerospace company).

Secondly, related to implementation but also operational issues senior management commitment is noted as crucial.

> "You then need extremely good management so you need usually strong and effective leadership, a leader, somebody who's got the vision. Because there are all sorts of difficulties, it's easy to talk about empowerment, in getting it done there are lots and lots of (difficulties)" (Training Manager, building products manufacturer).

On the part of employees there also appear significant difficulties. Employees have to be interested in the success of the enterprise themselves and personal recognition is extremely important. Although employees are directly dependent on their company for their livelihood it seems that this is not enough. The employees of most large organisations nowadays appear overworked and stressed by the constant threats of downsizing and cost reduction. Therefore before putting more pressure on the workforce, the change towards empowerment has to ensure that they feel as though there is something in it for them. This is considerably easier with smaller companies, as employees can discern more easily the part they play in the business.

Similarly they also have to believe that their personal contribution is important; after decades of being set within boundaries and told what they are not allowed to do, it is unnatural to expect that employees on their own can reverse this state. This change has to come from the organisation and has to be continually consistent:

"but it took quite a long time for them [employees] to recognise that we meant it, and that something was going to change. [...] And we've got to be consistent from a management point of view and not consider it just to be the flavour of the month, which, we've had that before. One of the other things about management being consistent that our plant director, been here 34 years, he is the 16th plant director that we've had in that period of time, so that consequently, you know, we have tended to have changes of direction. The new guy at the top got different priorities. So what we're trying to do is build a sort of process that will withstand changes at the top. And if there are future changes, we won't be changing course significantly" (Personnel Manager, car manufacturer).

4.2.3 Presentation of findings on IS and empowerment

In this section we discuss the interview findings in relation to the role of IS in empowerment. Firstly we provide a broad overview of IS use in manufacturing organisations and then we concentrate on IS support in empowerment. The chapter concludes with an outline of the main problems that organisations noted regarding IS support for empowerment. Wherever appropriate the interview findings are complemented by survey respondents' comments in tables.

4.2.3.1 General IS context in manufacturing

As expected (since the companies were in part selected for their use of IS) all companies were heavily involved in IS. Regarding their technology, most companies have a combination of mainframe and PC systems. Most core systems are still run on mainframes, while PC-based systems are becoming very popular. Local area networks and wide area networks are usually in place with a noticeable move for many companies to migrate to Windows NT, due to its general compatibility with Windows applications. Electronic mail was established in all 18 companies and is widely used in most cases, and some companies have introduced Lotus Notes. A significant rise in PCs is noted in manufacturing companies: one FMCG manufacturer (Walkers Snack Foods) went from 200 PCs to 1,200 in two years, while in 1992 in a site of 700 people they had only 4 PCs. Similar trends were noted in all companies: one had installed more than 300 PCs during 1996 in a 2,000 people site, while another had 400 PCs scheduled for implementation in 1997. The use of PCs although most prominent in offices, is rapidly expanding into production areas.

A few companies are in the process of implementing one of the recently popular Enterprise Resource Planning systems. These systems are essentially an integrated suite of packages that support all the main core processes using a common, integrated database. The implementation of such systems as SAP, Baan, Peoplesoft, etc., has numerous implications for the organisation; particularly for employees though the consequences of their implementation are likely to be quite significant in terms of changes in work practices.

Most companies have in place a hybrid IT organisation comprising a central IT department (which sets out IT strategy, coordinates activities, sets standards and so on) and a few IT people based at each manufacturing plant, depending on its size. A couple of companies have outsourced and subsequently their IT organisation is quite different.

4.2.3.2 Information systems and empowerment

Comments on whether IS can support empowerment
Information systems do not make employees "empowered" - empowered employees use IS in different ways.
Minor support in relation to shopfloor empowerment!
It is the key piece in the empowerment jigsaw.
Vital enabling tool.
Empowerment is firstly an attitude and expertise issue.
Must go together with computer literacy/ user friendly IS.
It is the people that make the difference.
Easy to overestimate importance of IT in manufacturing.

Table 4.5: Survey respondents' comments to questions 15 and 16 as noted on the questionnaire

As employees assume broader tasks and responsibilities to make decisions, solve problems and improve operations, the support that IS can provide is potentially important (see Table 4.5). Indeed most companies were clear about the role of information systems:

"There's no good passing down responsibilities without equipping the people to be able to carry that responsibility, and that's skills and knowledge, but then it's that the knowledge is split into two: knowledge about, the sort of perhaps underpinning knowledge and then relevant information arriving to enable the work to be carried out" (Personnel Manager, car manufacturer).

The interview and survey data seem to support our proposal that IS can support employees in fulfilling the responsibilities brought on them by empowerment, rather than IS actually being able to empower employees (see Chapter 1).

"I don't think our systems strategy has led or created empowerment" (Personnel Director, commercial vehicle manufacturer).

"Empowerment is a personal feeling "I want to/I feel capable of taking decisions" and you don't get that from a computer" (Questionnaire response).

"I don't necessarily see, for many people, that IT of itself leads to them becoming empowered. I think I know what people mean by that, but I think sometimes it's exaggerated [...] So, I mean once the [system] is going, then I think you can say, well then, the staff concerned do become more empowered in the sense that they could do more things more easily." (National Manager, FMCG manufacturer).

"The role of IT [is] supportive rather than initiative" (Questionnaire response).

This was clear in many cases where IS were indeed able to 'empower' employees, but the organisation did not permit it:

"At the moment for major capital spendings, there's a list of about eight departments that approve a capital spend - actually sign the capital spend, saying "I approve this". Now some of those which purchasing is one, where this specific example came from, all they really are doing is acknowledging, they aren't saying this is a good idea or this is a bad idea, they are just saying "I am aware of this". Now there's absolutely no way in which this should be happening in the 1990s. We should have mechanisms in place, IS-based that say to purchasing "these are the things you need to be aware of that are happening in this area"(IT Strategy Manager, car manufacturer).

Thus the technology is available to support a more immediate and effective way of doing things, and could empower employees to take the decisions without needing the eight signatures, as they can inform e.g. the purchasing department of the various spendings via IS. Nevertheless the formalisation of established procedures prohibits this taking place. The IS of an organisation are designed, built and used according to these institutionalised characteristics:

"The systems facilitate [the speedy response to events at operational level] when the business allows them to. Managers tend to get a bit wary of systems that actually bypass the hierarchy. Managers tend to be rather too influential in the design of systems for good operational efficiency. So the actual culture has to be there not just the systems" (IT Strategy Manager, car manufacturer).

4.2.3.3 Information systems in support of empowerment

Employee decision making is critically dependent on distributing the right information at the right point in the business process. The delegation of responsibilities necessitates skills and knowledge, but (as noted in the quote above) that 'knowledge' consists of two elements: the underpinning, in a sense 'static' knowledge an employee has regarding the task at hand, and the dynamic information that links the task to the whole process. Both are absolutely necessary and if one is missing then empowerment cannot operate successfully:

> "we've got a lot of very skilled, very bright individuals in our organisation, and they are more than capable of making the right decisions along those business processes. And quite often they just don't have the information to make that decision" (IT Manager, pharmaceuticals manufacturer).

We grouped the most important support functions exactly as they emerged from the interviews:

Support for decision making

Comments on IS supporting decision making
The use of suitable systems will provide employees with the data they need to make their own decisions.
Will provide key market data, regarding customers/products to enable more important decisions to be passed down.
The use of control charts leads to better insight and hence better quality decisions.
People's ideas and decisions are only as good as the support mechanisms they have, to provide information to aid decisions.
Availability of adequate local information on which to make decisions.
Problem solving and/or analysis.
By providing middle management with speedy, accurate decision making tools.
Helping understand consequences of decisions.
Increased knowledge can lead to better decision making on anything from work planning in teams to monitoring quality.

Table 4.6: Survey respondents' comments as noted on the questionnaire

Information systems can enable employees to get access to the data required to take decisions and lead to delegation of decision making (see Table 4.6), providing the organisation so wishes:

"As confidence grows in the new operational procedures there can be a steady flow down of decision making, e.g. on material call-off, shift pattern, etc." (Questionnaire response).

These decisions can range from everyday operational to more complex and significant ones, depending on the task at hand. For example employees on a car production line need information on specific customer orders:

"But clearly the information systems role here is to make sure that people are getting information through as fast as possible from the customer and that it is presented to the local management or - in some cases - the actual local team leaders at the level which is appropriate to respond to the need so the complexity of the information systems is around taking that order and breaking it down to local decisions" (IT Strategy Manager, car manufacturer).

On the contrary, in the more complex production process of aircraft engines, the information systems can also provide access to the 'knowledge' that is needed and which employees may not possess:

"people lower down the organisation have access to the information and knowledge necessary to make decisions" (Questionnaire response).

"There is a lot of that wisdom in the senior levels who are actually able to say: 'well I don't think that will work there'. That sort of wisdom can actually save millions of pounds but it does mean that lots of decisions to change designs, all the rest of it, kind of get sucked up at the top. Now one of the changes that we expect IT to bring is to make some of that wisdom available [...] to the person making the decision so they don't have to refer the decision upwards, they can access the wisdom and integrate that into their decision process" (Personnel Manager, aerospace company).

Access to general information

Comments on IS providing access to information
Help facilitate the change process if providing relevant information which can be effectively acted upon.
Delivery of information to right place/ right time, etc.
Empowerment needs rapid distribution of information.
Ability to see the whole task to work from start to end using IT skills and systems.
Process knowledge.
Ownership of the process/task and self esteem/motivation.
Individual creativity and development.
Provision of accurate, timely and relevant information.
Inputting of, and access to, data at lower levels within the organisation.

Table 4.7: Survey respondents' comments as noted on the questionnaire

The access to all the necessary information is critical for empowerment:

"Accessible information is essential to the attainment of empowerment goals" (Questionnaire response).

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Information provision can support employees in many ways (see Table 4.7). Firstly, IS can support business performance reporting on many items, such as sales volumes, profits, market share, prospects, business plans and so on. All this information is related to enhancing employee understanding and involvement in the business.

"You go around some of our factories and you see quite a lot of charts about scrap levels or product delivery performance or improvement group activities, computer-produced. And you ask who's done it; it's quite often the operators" (Personnel Director, cables manufacturer).

Operatives frequently use PCs to produce their own graphs showing performance indicators, whereas before in most cases these performance indicators were calculated in a different form and by a higher level in the hierarchy and put on bulletin boards or other similar mediums. Undoubtedly the process of operatives doing it themselves, significantly improves the impact it has on them.

Information about product performance and quality is in some cases disseminated down to the shopfloor through IT. In the continuous improvement process of a car manufacturer, information systems assist in providing better, quicker and more accurate and relevant feedback from customers. In line with the continuous improvement ideas though, the customer is not merely the person who buys the car. The employee who receives immediately the output of one's work, the next person on the conveyor, are all considered customers and their feedback is important. IS can assist in improving the form the necessary information is presented in, by analysing the information and putting it in a more readily understandable and usable form. This appears to be considered more useful compared to paper-based systems.

Companies seem aware of the benefits that the provision of information holds in promoting employee interest through linking their work to the customer:

"and nowadays we tend to give people more information. If there's something going through the shop for a specific customer, you can find out who the customer is. You know, and in the past it was just something you'd got to make. But now you can see who it's going to much more. So in some ways we're giving out more information to make the job more interesting for people on the shopfloor" (IT Manager, engineering company).

Task automation and facilitation

Comments on IS providing data for operational tasks and activities
Single source of data (i.e. databases); control; analysis; project management.
Speed of response to events at operational level.
Allowing defect analysis and continuous improvement activities at shopfloor, team level.
Being able to plan more effectively/ planning of activities.
Progress of product through manufacturing process/ control of production processes.
Speedy feedback.
Reporting on performance.
Supporting interworking in teams.
QA and material control.
Giving access to information on which to take action.
Information as basis for improvements.

Table 4.8: Survey respondents' comments as noted on the questionnaire

Information technology and information systems have facilitated employee tasks (see Table 4.8). Shopfloor staff can enquire on up-coming jobs, check whether an item is on stock without having to walk to the stores, and receive process instructions on screen for how to do things. The facilitating impact that IS appear to have relates essentially to timeliness and availability:

"what we want to do is ensure that the vital information that a person needs for their job, they get it in a timely way and it's available to them. Whereas, previously, it sometimes wasn't available to them. It sometimes was filtered through various people and over time" (Personnel Manager, car manufacturer).

IS also automate and facilitate many of their everyday tasks, thus saving time and effort. This is quite significant and should not be underestimated as in empowering organisations employees still have to perform all their usual traditional tasks alongside their 'new' responsibilities. A common result is that employees are overworked and 'burnt out' by the intense workload.

"[IS] free managers from chasing around getting, reporting data, gives them more time to devote to their people" (Questionnaire response).

In many continuous improvement applications, employees have assumed quality control tasks. In a car manufacturer, shopfloor operators input data related to quality assurance monitoring into the system and receive product quality-related information. A communication network relays information that is gathered at the quality check areas, to a central computer. Team members

using remote PCs located throughout the plant can then access details of any vehicle on the line.

> "Now we share all that information. There was a time when we didn't share that information to employees. So now most things that we can measure, we share with employees" (Personnel Manager, car manufacturer).

Operators tend to receive data on machine performance in terms of quality and efficiency. Information regarding what job orders are coming or quality-related data can enable employees to be more proactive rather than reactive and can warn them about events which is in most cases preferable for the organisation, but also for employees as it allows them better control over their job.

> "This information now is more readily available or available to the people who are doing the job, we expect them to act upon it" (Personnel Manager, car manufacturer).

However there is potential for limiting employee discretion and intensifying the responses expected from him/her:

> "So you say, why don't you do something, you knew, you've got the information. Can't argue any longer, well I didn't know that. They did know. So why haven't you done something about it?" (Personnel Manager, car manufacturer).

The fact that information is provided to employees in a timely manner can enable them to be more proactive, but it can also be used by managers to press for even quicker employee responses to it. In production environments such as a car assembly, there can be a significant danger of IS contributing in constraining employee latitude and freedom further.

There is another implication though of the use of IS by lower level employees that has stemmed from the automation of tasks: IS have enabled a broadening of roles and responsibilities.

> "We have production control systems which have allowed production operatives to have a much more interactive role with the materials management processes for example. So they are doing something they didn't do before, they are influencing part of the organisation they wouldn't have been able to access before and that's largely because IT has made that information transparent to them; its made it accessible to them. Previously it would have all been on sort of record cards or whatever, locked away in the materials management unit, a separate unit entirely" (HR Manager, health science company).

IS can - providing the organisation allows it - break through the barriers between departments and enable employees to access wider parts of the organisation than those traditionally available to them.

"Sort of five years ago, if I wanted to know who had spent what, it all came in hard copy. If there was an excess I used to go and phone up the Finance Department and say, who spent this ,and this cost so much and what on earth is it? Nowadays you do it by the screen. You go all the way down, and it comes out and it says [...] I'm not frustrated waiting for someone else to tell me the answer. And most people can do this" (IT Manager, engineering company).

Communication

Communication
Customer contact.
Communications.
Internal communication between teams.

Table 4.9: Survey respondents' comments as noted on the questionnaire

Information systems are widely used by employees for communication purposes (see Table 4.9). In a car assembly plant if, for example, a team that is responsible for assembling a particular component, have a problem as a result of a faulty sub-assembly further up the conveyor, they use the network to relay the relevant information to the team responsible for the sub-assembly.

IS can also be used to facilitate communication between various departments:

"There's no reason why if we had screens out in the plant, employees can't come in and enquire. So he's got a payroll query, he can key in and possibly find the solution, the answer to his query. And he's got access to his file" (Personnel Manager, car manufacturer).

Similarly in an electrical products manufacturer that had to cut down on support jobs, shopfloor operators have access to the entire ordering system to order parts for the line and are encouraged to do their own absence statistics and their holiday booking direct on-line, to minimise the amount of work for the personnel department and facilitate internal procedures. Nevertheless, the two companies that mentioned that they are considering to allow employees access to input data into their own personnel files have not implemented the idea yet.

Although many companies mentioned the use of computerised process instructions (regarding assembly of components etc.), concerns about their actual value were expressed. It is worth noting though that in one car manufacturer the process instructions are used as a basis for team discussions:

> "we've recently implemented a new system whereby the guy has access to computerised process instructions rather than paper ones, so they tell him how to do it by now they have the ability to use screens to look at assembly drawings and the like. The extent to which that is really useful in the environment of an assembly line is interesting. I don't think we've quite yet cracked the technology which gives an assembly worker useful instruction at the point of assembly. My understanding of the way they use this new facility is they intend to use it in team discussions about quality rather than actually to support that dimension" (IT Strategy Manager, car manufacturer).

Apart from these support functions however, we had developed during the course of the research a proposition that IS can support empowerment by bringing into the organisation the idea of the customer and providing a stronger link between an individual's tasks and the customer of the final product. As noted above, the understanding that the customer really drives the business is held as a critical factor for the success of empowerment. In most cases though the division of tasks has removed the idea of the customer further away from the production operations. For example it is fairly standard practice in most industries for operators to receive a fairly precisely formatted manufacturing view of the order.

> "So for instance, in terms of what parts to fit we have a mechanism where by what they actually see is not a part number as such but a bin number reference so they say the harness is in bin A4 for this vehicle and the next vehicle the harness is in bin A6" (IT Strategy Manager, car manufacturer).

Thus employees do not even see the component as a part of a car that they are building but rather a part coming out of a bin. Therefore if IS were found in any way to create a link with the customer, then we could claim another support function. We did not however find evidence for such a claim apart from only one instance where the customer's name and details accompanied the car on the line.

4.2.3.4 Problems and difficulties encountered

Although the interviews provide ample evidence of the supportive role of IS in relation to employees, a wide range of problems and constraining aspects also frequently emerged. These surfaced either as elaborations of responses to question 14 in the questionnaire or in the unstructured discussion. The constraints, in most cases, cannot be unilaterally attributed to either technological or organisational factors (see question 14) but rather seem to involve many interrelated aspects. These are detailed below.

Access constraints

Relevant comments for steps to enhance IS support for empowerment
Accessibility, freedom of information exchange
More PCs available for access and training
Everyone having direct access

Table 4.10: Survey respondents' comments as noted on the questionnaire

Firstly many difficulties and inadequacies were noted regarding access to information (see Table 4.10). The specific tasks that an employee has to perform have traditionally been the basis on which information provision has been determined:

"If I am an operator then the business's information systems are not particularly accessible to me" (HR Manager, FMCG manufacturer).

Manufacturing operatives are mainly using only production computer systems. They may have access to computer screens in terms of production control, programming ingredients, process operating instructions, necessary materials, for ordering parts and equipment, and to inform them that the production line has stopped. However these facilities are essentially for specific, production-related activities and are much more for input purposes, (e.g. reporting completed jobs, assemblies, etc.). Other than that, operatives usually do not communicate more widely (e.g. via e-mail or other communication systems), or have access to IS of other functions.

"They [lower-level employees] have access to systems that they are allowed to and there is very strict security on our systems, that people have access only to those systems that are specifically relevant to their job" (Personnel Manager, aerospace company).

"They may have access to computer screens in terms of programming ingredients, but in terms of, do they have electronic mail, do they receive communications that way, no they don't. It's still very traditional in that sense" (Personnel Manager, FMCG manufacturer).

These specific screens are essentially dedicated terminals running one system and what operatives see is pre-determined; there is no sense of exploration or the user having control of the interaction. In most cases the user's role is passive and the system prescribes the screens he/she can view.

We believe that limited access and the principle of "need to know" as the basis of information provision is a major constraint in the use that employees can make of IS in empowerment. We use a powerful example to illustrate the point:

"So quite a lot of the [new] system is about open information that says *need not to know* rather than *need to know* is the criterion for deciding what is in there. In other words only the things that people mustn't know, like details of a new product, are not there. [...] you can, as an assembly line worker, not just get the customer's name on the order but you can actually find out the total history of that order if you want to. Whether the guy really wanted blue paint and he settled for green because he was told that blue paint was going to delay the order for a week. That sort of little piece of information is the sort of thing that might be able to make a team leader say 'why should paint be an issue? I can change the paint in five minutes time. Who is it that's making that decision?'"(IT Strategy Manager, car manufacturer, emphasis added).

Information inadequacies

Relevant comments for steps to enhance IS support for empowerment
Reduce complexity, duplicate data. Improve 'core data'
Ensuring the right information is available at the right time to the right people
Better admin. support to enter data and maintain databases, etc.

Table 4.11: Survey respondents' comments as noted on the questionnaire

The lifting of access restrictions and the unlimited provision of information does not necessarily mean that IS can effectively support employees. In such circumstances, information overload and the difficulty in locating the right

piece of information when it is needed, can again constrain employees (see Table 4.11).

> "Quite often the task of finding the appropriate information for their purpose overwhelms people. You don't do it, you therefore make a guess or a judgement or whatever based on whatever relevant information you've got or incomplete information you've got" (Personnel Manager, aerospace company).

An overload of information is normally detrimental rather than beneficial. Particularly regarding electronic mail messages, users often noted an abuse of the system that replaces even simple communications that could be easily conducted face-to-face.

It seems that companies are facing difficulties in ensuring that employees have the correct, relevant information. One way to overcome this difficulty is perhaps to have information 'sorted out' for employees.

> "There is a risk with information systems that you further overload people with information so you have to put in tools to allow people to search quickly and effectively for the relevant information" (Personnel Manager, aerospace company).

However whatever the solution, the amount and type of information that is provided to employees beyond that which is absolutely necessary for their tasks, has to be carefully thought through. It is not merely that organisations need to give out information, *what* they give out is also important:

> "in our organisation, particularly within the manufacturing operation, there is a temptation to measure everything that moves. And at the base level I don't think we understand enough about our process to identify what is an important measure and what is not. So one of the risks associated with the increase in ease of access to information and the technology, is that we're simply going to measure more things quicker and generate more pieces of data. While data's great, information is helpful, so that I think is our challenge. There is however a clear insight into our need to manage data systematically and consistently" (HR Manager, FMCG manufacturer).

The form that data is presented in is equally important for employees. As noted above IS can support business performance reporting on items such as sales volumes, profits, market share, and so on. As for employees though these items of data often have a 'remote' and abstract feel, the challenge here is that they need to be assimilated in a format that people can read and internalise easily.

Systems architecture/structure

Relevant comments for steps to enhance IS support for empowerment
More x-platform standardization
Ability to link up computer systems
Increasing use of distributed systems and company intranets
Decentralised IS
(System) communication - integration
Agreeing company wide standards for hard- and most importantly soft- ware
Creation of internal 'intranet' systems to make information available to those who need it for their job

Table 4.12: Survey respondents' comments as noted on the questionnaire

Closely related to restrictions of access is the issue of separate information systems that run in the various parts of the organisation (see Table 4.12). One of the most important concepts for empowerment is the need for the employee to take onboard a much broader set of responsibilities than the ones determined by the narrow specification of his/her tasks. IS can (in theory) support the ability of employees to see the whole task from start to end (see Table 4.7). At the moment this is not possible due to their structure. As manufacturing organisations have for years been built around functions, a separate system was designed and built to support each specific function. These promote a 'compartmentalised' view of the organisation and when employees need to have a look "across" the organisation, it is simply impossible. For example, in an order fulfillment process, each stage - the customer service department, the planning process, the delivery process, the invoice payment - are usually all supported by different systems. If someone wants to go back and check why something went wrong, the systems do not allow one to see the whole task and whole process.

"If somebody has a problem here if you enable them through some sort of system to go back and analyse where the problem came from, they may be able to rectify it themselves. [...] So I think hugely that will help in terms of people understanding where their work fits in" (HR manager, oil company).

"This new company is made up of four old environments, we've got four sets of different legacy systems. So the ability to see information right across those, those four old companies if you like, is damn-near impossible" (IT manager, pharmaceuticals manufacturer).

For managers the situation is the same; for them though this does not pose such a big problem, because they possess the broader picture and an understanding of how things 'fit together'. Employees that have been doing one or a few tasks for 20 years, usually do not know where their task fits in and how what they do influences everything else.

> "But until we have a different not necessarily organisational structure, but different ways of communicating, looking at cross-functional processes, and using the IT systems [...]. It's not about getting new IT systems, it's actually using what those IT systems are very capable of doing to our advantage, we will not get the benefit of this cross-functional approach. [...] some of the systems we actually have go across, but because of the structure people don't use them that way. They are only interested in their little bit of the process or their customer or supplier or whatever" (HR manager, oil company).

Even in the cases of some systems which do cut across, organisations tend not to use them in that way. This is where we hit boundaries that are set up and closely guarded by each functional department that define their territory and prohibit employees from other departments entering their IS. Thus this issue is not simply technical but also determined by organisational factors that seem to create and recreate the situation.

> "When you talk about integrated packages, so that everything's under the same umbrella, the same supplier, the biggest problem is people still trying to run them in the Departments they used to have" (IT Manager, engineering company).

Similarly IS are also usually designed based on the discrete, different tasks within a certain function.

> "It's clearly necessary for various systems to talk effectively to one another. In my own area we have a Human Resource system, we have a payroll system, we have a pension system. Historically those three never talked to one another; we had to manually transfer data between them. We're now just getting to the point where they do all run off the same database" (HR manager, health science company).

Too much prescription by system

Empowerment encourages a minimum specification of actions to promote creativity and flexibility. Information systems however are often viewed as imposing some sort of control over work processes – what has been termed in the IS literature as 'social control' (Land, Detjejaruwat et al. 1983). This is regarded differently depending on the type of work process:

> "it's probably a good discipline in our manufacturing areas which need to be regulated, they need to be more routinized than they are today. I think it's less desirable in an R&D group" (HR Manager, Health Science company).

The problem with standardisation was explicitly addressed by one of our interviewees:

"I mean sometimes people try and design computers to do certain things that are not necessarily best done that way. It goes back a little bit to trying to put too much into them sometimes. But resulting in almost putting a very rigid, mechanistic way of carrying out a process and that I would class it as inappropriate. We try and try to bring about getting people to think about how to get things better, but every action you take is constrained by the computer system even where you could legitimately have a thought process to go through" (Personnel Manager, aerospace company).

In one case an information system used to try to tell a storeman almost exactly where to put a part:

"and so the amount of information, the amount of prescription, if you like, in the system, was enormous. Now we deliver the part to the team and allow them to [...] make the decisions about, well, today, it's better to have this part and this part of my work space. But next week, because we've got a different mix, I want it over here. So we've almost backed off in terms of prescribing information to people, and let them do their own thing, where the scope ought to be. [...] In the factory we used to have a location, a left-hand side, a right-hand side of the track for example. And the system expected that information to be accurate. But the guy who was actually bolting it together didn't understand why that was important. And the reality was he was right, it wasn't important" (Systems Manager, commercial vehicle manufacturer).

"Technology if we are not careful can actually inhibit empowerment because you try and design everything in. You try - if you like automate the human being towards a work plan. So you've got this dual risk; if you do it right, if you can, it can and will empower employees but it can also be an awful policeman and an inhibitor." (Personnel Manager, aerospace company).

Technical difficulties

Relevant comments for steps to enhance IS support for empowerment
Simplified, easy-to-use and capable of adapting to new systems
Make them as user friendly as possible
More reliability in system, more reliable operating and applications software for PCs
Extension of systems and updating older systems in certain areas
Greater flexibility
More simple input facilities (keyboard)

Table 4.13: Survey respondents' comments as noted on the questionnaire

The technology has been causing problems for the vast majority of companies (see Table 4.13). The difficulties with mainframe technology were noted by many companies:

"It's really impossible to get information out of a mainframe" (Team Leader, Personnel, car manufacturer).

"They were never really quite right for anybody's problem but you kind of made do with them. I think now we are kind of seeing a trend where there is more capability for bespoke tailoring within IT systems and I think that's what I meant by flexibility. The more I can take something and tailor it to what I need and my colleagues can do the same, the better" (HR Manager, health science company).

Significant difficulties with user-friendliness were also noted:

"Within a very traditional industry, the systems require to be developed to allow greater user-friendliness" (Questionnaire response).

Many respondents stressed the need for decentralised, distributed systems and intranets. In one of our cases an intranet has been recently set up to allow research scientists access to data held on different platforms (Hobby 1996).

Inadequate user skills

Relevant comments for steps to enhance IS support for empowerment
Better training and an ability of computer 'trainers' to speak in plain English.
Higher levels of IT literacy from operatives.
Evaluated training.
Facilitate entry level training for less experienced users.
Extensive support/training mechanisms in place.
Easy access to training

Table 4.14: Survey respondents' comments as noted on the questionnaire

The skills that employees possess regarding the use of IT strongly constrain the support that IS can provide to employees (see Table 4.14):

"one of the things that holds the organisation back is our general IT literacy" (HR Manager, Health Science company).

Naturally IT skills are not equally distributed and differences are to be expected; these can have various consequences.

"There's been a certain disconnect in that the majority of the workforce have been far more computer-literate than the people running it" (Personnel Manager, aerospace company).

This has certainly acted as a constraint in the support that IS provide for empowerment as senior management did not appreciate the value and usefulness of IS as much as their staff did.

Age appears to be correlated with IS skills in the majority of cases:

"A lot of people coming into the organisation in their twenties are extremely IT literate. A lot of people who have been in the organisation for some time are less so, and I think like most organisations we have a considerable task in making people more IT literate so they can see how systems can help them in whatever it is they are doing" (Human Resources Manager, Health Science company).

"I think for lots and lots of people IT, certainly if anybody, say over, say over 35, it is actually quite difficult" (Personnel Manager, FMCG manufacturer).

IT department

Relevant comments for steps to enhance IS support for empowerment
Faster development cycle
Better compatibility between system design; IS function and culture; user understanding
Better integration into management of the business
To understand the value of information and the ability to usefully analyse it
Gaining total commitment and involvement of users, good project management and speedy management action to rectify mistakes
Further analysis of requirements
Ensure all levels of the company understand fully what is intended
Greater vision of what can be done rather than introduce systems to do what we already do quicker/better
Systems designed for empowerment

Table 4.15: Survey respondents' comments as noted on the questionnaire

The IT/IS department is usually responsible for user training. However, their role stretches far more than just providing training. The IT department is usually critical for the successful use of IS in empowerment (see Table 4.15). Nevertheless in many companies, users noted difficulties with their IT departments. For example, users are usually not aware of the tools that can support them in their work and expect such assistance from the IS department:

"A better understanding of what's available" (Questionnaire response).

"Easy identification of computer tools to use at work" (Questionnaire response).

Similarly users often 'complain' that their IT department does not pay particular attention to their tasks and work practices:

"the Information Systems Department have not really shared the same agenda that the manufacturing group did when they were embarking on their change programmes, and were a reluctant partner. And spent an awful lot of time focusing on financial control systems or financial accounting or sales order processing. But did not get incredibly close to the manufacturing agenda. And some of that has to do with deep-rooted perspectives

on where their priorities lay and on managing the business" (HR Manager, FMCG manufacturer).

In other cases the IT department's attitude to user involvement in the development process caused friction and failed to deliver satisfactory systems:

> "most of the users in our company, because they're effectively shut out of the IT process, they're asked what their requirement is for their computer system but they then have no influence in terms of how it's actually happening. They then get the product delivered here, this is what you asked for, and they go and test it and it doesn't work, it doesn't quite do what they wanted because they weren't really involved in the project in the first place" (Personnel Manager, FMCG manufacturer).

One respondent believes that:

> "giving control of development to users" (Questionnaire response)

is essential to enhance the support that IS provide for empowerment.

> "I've been working on a project for introducing some HR software into the UK and into various locations in northern Europe. [...] At the end of that project, there was a big project meeting in IT [...] you know all the people that had worked on the project, they all had a meeting and they wouldn't invite me, because they said I was a user, I wasn't actually part of the project. [...] they weren't prepared to come and sit down and talk to me as a user, which I thought was just terrible" (Personnel Manager, FMCG manufacturer).

With the IT department "imposing" solutions on the users, the latter are likely to feel less in control of their work and the tools they use, and such feelings can extend beyond the use of the individual systems and constrain the support that IS provide for their work.

There are also various other issues that pertain to the link between the business needs and IS implementation issues that companies noted as critical to enhance the support of IS for empowerment. These obviously suggest that users are facing problems with IS projects:

> "Continued focus on business sponsorship and delivery to business plan and time-scale" (Questionnaire response).

> "A more coordinated approach across the organisation to avoid 'ghettoes' of limited progress" (Questionnaire response).

> "Increased senior management support for major projects" (Questionnaire response).

Users' attitudes towards IS

The various attitudes that employees develop regarding IS and information can be critical in their use of IS. These attitudes depend on internal as well as external factors (Culpan 1995; Orlikowski and Gash 1994; Roberts 1987). Employee attitudes towards IS are beginning to change in some cases; employees are interested to take on IT training in out-of-work hours without getting paid for it:

> "and this is in their own time, so it's their own self-development. [...] a lot of people are gathering more and more knowledge and are keen to get involved. [...] So it's not something that we have to, I suppose, any more encourage. It's self-generating. Whereas when it first started, people were 'how much are you going to pay me for doing this'" (Personnel Manager, car manufacturer).

However the situation is still quite 'shaky' and organisations have to carefully and consistently cultivate users' attitudes towards IS, particularly since in manufacturing, computers have a history of replacing workers (Hodson and Parker 1988; Shaiken 1984). For example, instances of inappropriate IS use by managers can make employees wary of IS:

> "the slight danger is that some managers I think are inclined to use IT as a control way and I remember one job manager who used it as a sort of weapon of terror" (Personnel Director, cables manufacturer).

Or on the other hand, too many and frequent changes of the systems that are used might result in making employees feel uncomfortable:

> "perhaps we should skip out a few generations of software occasionally; we don't necessarily have to have the version 6.1 and then the version 6.2 and then the version 6.2a. We can perhaps jump from version 6 and wait for version 7 to come along and go in big chunks, because I think - again I say this from a user's point of view - it's just as disruptive to take these little steps as it is to wait and take a big step" (Personnel Manager, building materials manufacturer).

Too frequent changes of systems can impede effective incorporation of IS in the everyday practices of employees, particularly as in manufacturing lower-level employees have not been using IS for a very long time and are thus not totally comfortable with them.

In a very traditional car manufacturer senior production managers just refuse to use electronic mail:

"I have a lot of problems with a couple of managers. Usually the ones - the production managers who do not read their PROFS [email system], full-stop. So it makes my job a lot harder because what then I have to do is chase up like literally, physically go to the production offices, try to find the manager to let him know" (Personnel Officer, car manufacturer).

Such attitudes can pose significant constraints to the support that electronic mail can provide for communications between employees.

Undoubtedly other issues come into play regarding the personal attitudes of users towards information technology, which are, in the main, a result of both 'internal' but also 'external factors:

"There is absolutely no doubt that we are demonstrating incredible amounts of self-censorship. People won't let outside the narrow information to do with their job" (IT Strategy Manager, car manufacturer).

4.3 Summary - Conclusions

Table 4.16 summarises the main interview findings regarding IS support for empowerment.

IS support functions	Main difficulties in IS support for empowerment
Support for decision making Access to general information Task automation and facilitation Communication	Access constraints Information inadequacies Systems architecture/structure Prescription by IS Technical difficulties Inadequate user skills IT department Users' attitudes towards IS

Table 4.16: Summary of findings on IS support for empowerment in manufacturing.

This chapter presented the initial empirical data that was collected through a postal survey and a series of in-depth interviews in selected companies. This evidence helps to focus and clarify the conceptualisation that was formed at the outset of the research (see Section 2.1). The two different research methods were employed sequentially (see Gallivan 1997) and their findings mostly converged (Jick 1979). On a couple of issues though the interview findings helped to clarify descriptions provided on the questionnaire and thus achieve a better understanding of the particular situations. For example, initially we had assumed that since employee responsibilities change, then IS

and IS-related practices should change too. Although many companies noted in their survey responses various changes to their IS due to empowerment, the interviews revealed that those changes were not just a result of empowerment, but rather a result of the wider change initiatives. As discussed above, empowerment is only one part or a result of broader change initiatives and these change initiatives are only a small part of the business requirements that IS departments have to respond to. Thus it is very difficult to isolate a simple, linear, cause-and-effect relationship between the encouragement of empowerment and changes in IS.

Hence the interviews demonstrated that our initial proposition that empowerment should bring about changes in IS and IS practices is too simplistic and cannot accurately describe organisational practices. Therefore the new requirements created by empowerment should not be considered in isolation but rather placed within the entire organisational context.

The main contribution of the survey is the collection of original empirical data on an issue which has not been previously addressed in British manufacturing. The series of interviews provided rich insights into the way empowerment is pursued, what it means for different organisational actors, how it is perceived, and the effects it has on employee work practices and other organisational elements. The interview data revealed a useful additional view of empowerment as 'emergent' or 'unintentional'; not all companies introduce empowerment through some formal, conscious change initiative as most of the management literature suggests.

The interviews also provided a broad assessment of the role of IS in relation to empowerment. The use of IS, however sophisticated it may be, cannot be said to "empower" employees. Our empirical work suggests that IS are regarded as a support tool for employees but many difficulties appear when employees come to use them to support their enlarged roles and responsibilities.

The business literature on empowerment proclaims the need for increased information provision and almost assumes that everything else will flow from that (see Chapter 1). Allowing employees more access to the existing systems however does not mean that they can be usefully incorporated into their working practices. The interviews highlighted the organisational factors that constrain the way IS can be used to support employees in manufacturing organisations that are encouraging empowerment practices. These relate to the design of the systems and the established uses they have within the organisation. In order to better understand these problems and explain why they occur, two in-depth case studies were conducted which are presented in the following Chapters 5 and 6.

CHAPTER FIVE

INFORMATION SYSTEMS AND EMPOWERMENT IN BICC CABLES

This chapter presents and discusses the case study conducted in BICC Cables, one of the largest cable manufacturers in the world. In the questionnaire that we sent out initially, BICC responded that they were actively encouraging the ideas of empowerment. After the subsequent interviews with the Personnel Director and the Information Systems Director, it was assessed that the company possessed some valuable experience in the role of information systems in empowerment. Although in theory the organisation seems to perceive IS as a supportive tool for empowerment, the initial interviews revealed a wide range of concerns and difficulties with their existing information systems, which suggested that a case study in the company would be of interest and value to this research.

The aim of the case study was to identify the way employee empowerment is pursued in practice and to assess the support that the existing IS in the company are providing, particularly to employees at the lower hierarchical

levels of the organisation. In the following sections we present the findings of the case study which was conducted in BICC Cables Limited during the period January to July 1997.

The case study is structured into two parts: the first presents the data in a more 'descriptive fashion' trying to give an overall understanding of the case, drawing extensively on the interviews and using interviewees' own words as much as possible. The goal here is to involve the reader into the case (Stake 1994). These sections present how empowerment is perceived and encouraged in the various parts of the company, discuss the uses that employees make of IS and identify the most critical difficulties that users are facing in relation to the systems. The second part consists of the case analysis which is based on the structurational model developed in Chapter 2. The analysis attempts to explain IS use in relation to empowerment in BICC and to trace the reasons behind these difficulties.

5.1 Overview

BICC Cables is a multinational manufacturing company that produces and installs energy and communication cables and cable systems. It serves markets throughout the world through its main operations in five European countries, Portugal, Italy, Spain, Germany and the UK, and also some sites in Africa and the Middle East. BICC Cables is part of the BICC Group of companies along with Balfour Beatty - a major international engineering and construction company - and several other engineering companies. It employs 10,500 employees at 35 different sites worldwide and its turnover in 1996 was £1.3 billion pounds (BICC Annual Report and Accounts 1997). Of those about 20 sites are located in the UK with just over half of the total employees. BICC Cables was organised into 5 divisions corresponding to the main European operations, although a restructuring exercise carried out in July 1997 grouped business units across Europe into product groups. Since this case study commenced before the reorganisation, it refers to BICC Cables Limited; essentially the sites of the company based in the UK.

Most production is made to order. Some sites like Power Cables manufacture a small range of very expensive products, (a single drum of cable can cost 120,000 pounds) whereas others, like Components, manufacture thousands of different products which are usually quite inexpensive. The range of customers is wide: from the large Regional Electricity companies and British Telecom to building and construction companies to the individual professionals that use household cable. With the privatisation of many utility companies in the telecommunications and power sectors, BICC Cables is facing increased competition while demand for construction and industrial cables and large power cables is rather static. Thus the company is focusing expansion and investments on growth areas such as optical telecommunications and data cables.

Table 5.1 presents some basic information about the manufacturing sites that were visited during the case study.

Business unit	Location	No.of staff	Main product lines	General Character.
Supertension Cable Systems	Erith, Kent	600	Power cable, high voltage cable	Small production of big value items, few customers
Components	Prescot	300	Cable system accessories	12,000 sale items, short production times, many customers
Construction and Industrial Cable Systems	Helsby (Head Office for 8 sites)	1,000 (8 sites)	Thermo-electric cable systems, industrial cables, flexible cable, construction cable	Large product range, many and diverse customers
Brand-Rex	Helsby	320	Data cable	Small quantities of a large variety of products
Telecom. Cable Systems	Whiston	400	Optical fibre, optical cable	Few customers, small variety of products
Power Cable Systems	Wrexham	400	Energy cable	2,500 cable designs, few customers, mainly electricity companies

Table 5.1: Manufacturing sites of BICC Cables visited during the case study

In the analysis of this case study we first discuss the organisational conditions focusing on the issues that are of particular relevance to empowerment. It is very difficult to remove the issues relating to empowerment from the organisational conditions because the latter determine and define the character of empowerment (see Chapter 2). Therefore empowerment needs to be placed within the broader context and related to the institutional

properties of the organisation. Figure 5.1 depicts the sites visited and the interviews conducted within the organisational chart of BICC showing the various divisions and subdivisions. Table 5.2 provides an overview of the formal interviews conducted during the case study.

Site visits in BICC Cables Ltd.

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                    ┌────────────────────────────────┐
                    │ BICC Cables Head Office, Chester │
                    │ Personnel Director & IS Director │
                    └────────────────────────────────┘
              ┌──────────────────────────┐
              │ BICC Cables UK IS centre │
              │      Systems Manager     │
              │      Project Manager     │
              └──────────────────────────┘
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| BICC Power Cable Systems | Telecommunication Cable Systems
Finance Director | BICC Components Ltd.
Systems Analyst | CICS
Finance Director | BICC Brand Rex
General Manager |

| Supertension Cable Systems
Finance Director & Systems Manager | Distribution Cable Systems
General Manager
Sales & Purchasing |

Figure 5.1: Informants and sites visited within BICC Cables Ltd.

Name	Job Title	Company	Date
Paul Holt	Personnel Director	BICC Cables Ltd., Chester	20/1/1997
Alan Harrison	Information Systems Director	BICC Cables Ltd., Chester	20/1/1997
Chris Tarrant	Financial Controller	BICC Cables Ltd., Supertension Cable Systems, Erith	30/5/1997
Roger L. Butler	Information Systems Manager	BICC Cables Ltd., Supertension Cable Systems, Erith	30/5/1997
David Williams	Information Systems Manager	BICC Cables UK, Helsby	4/6/1997
Richard Heyes	Finance Director	BICC Cables Ltd., Telecommunications Cable Systems, Whiston	4/6/1997
Chris Dold	Information Systems Manager	BICC Components Ltd., Prescot	11/6/1997
Roy Saunders	Finance Director	BICC Cables Ltd., Construction and Industrial Cable Systems, Helsby	13/6/1997
Mark Heneghan	General Manager	BICC Brand-Rex Ltd., Helsby	13/6/1997
Mat Clarkson	Project Manager for Lotus Notes Development	BICC Cables UK, Helsby	3/7/1997
Andy Nicholls	Director & General Manager	BICC Cables Ltd., Wrexham	17/7/1997
John Powell	Materials Purchasing Dept.	BICC Cables Ltd., Wrexham	17/7/1997
Debbie Davies	Sales Dept.	BICC Cables Ltd., Wrexham	17/7/1997

Table 5.2: List of formal interviews conducted within BICC Cables Ltd.

5.1.1 History - background to empowerment

BICC Cables is a one hundred year old British company with a lot of tradition and history behind it. Formed from the merger of British Insulated and Callender's Cables, it had manufacturing sites concentrated in the Midlands and North England. Like many other manufacturing companies that were formed from mergers and acquisitions, its manufacturing sites were always fairly independent with the centre playing only a loose coordinating role. The manufacturing directors running the factories remained powerful even after incorporation into the holding company. This was naturally echoed in the structure and the culture of the company, which was largely devolved, affording local management at the sites considerable autonomy and freedom to act. This background of decentralisation and autonomous units potentially creates a positive context for employee empowerment.

> "And the philosophy of the company was always that really; it's been decentralised, all powers devolved out to the manufacturing units and at the centre what you have is very much of a financial planning and monitoring type role. So when a factory manager needed to do something, as long as he was turning in the profit and the figures according to budget, then he was pretty much left on his own" (IS Director).

However at the level of individual sites, conditions were not favourable to empowerment ideals, especially during the 1970s and 1980s. BICC was a typical British manufacturing company characterised by the combative employment relations which were prevalent in the UK industry until the beginning of the 1990s (Batstone 1984; Millward 1992). Union presence was very strong; one site was quoted as having 27 unions involved at the same time.

> "If we go back in the seventies [it was] management by exception - the only time any manager talked to you is when you made a mistake. Terrible system, no one being told 'you've done a good job'; all you were being told is 'you did that wrong'. [...] You had this terrific chasm between supervision - white collar worker - and your shop floor workers" (IS manager).

Work organisation was very traditional in terms of working practices, the polemical relationship between managers and workers and the big division between white collar and blue collar workers. Strong demarcations between what people could and could not do, left employees with a very narrow and specific set of responsibilities.

Moreover, centralised pay bargaining was in place, so local management had little or no flexibility in the way that they rewarded their people. Rewards are a critical motivator for employees (Loscocco 1989; Lawler et al. 1992), and when in the late eighties central pay bargaining was abandoned and responsibility for pay-and-conditions was delegated to the business units, it brought about significant changes in work relations (Murlis and Wright 1993).

> "Now that [delegation of pay decisions] has had, I think, a fairly significant effect on the way we use people, the sort of jobs we now ask people to do and the way we reward them for it" (Personnel Director).

Some sites by now have moved as far as having all employees on a single monthly-paid status, making significant progress, since even to this day many manufacturing companies maintain the divisions between hourly and salaried employees.

In a sense the decision to delegate reward responsibility to the units acted as an enabler for empowerment and set the context for the new ways of working. It was complemented by moves to simplify and flatten hierarchical structures, to reduce the number of layers of management and to build up jobs with extra responsibilities.

> "So we have moved from being a very traditional British engineering company with strong demarcations between different employee groups, in heavy involvement of trade unions and under the sort of bad characteristics of trade unions - the more negative aspects, to a situation where now in our better factories we have considerable flexibility of labour, we have enlarged jobs both horizontally and vertically, we have tried to pass responsibility as far as we can down the organisation, we have tried to empower people" (Personnel Director).

Total quality management was introduced, along with team working and job redesign aiming at the delegation of decision making responsibilities and integration of indirect with direct work[1] That change process commenced in 1988 and is still continuing; yet it is far from homogeneous. As each site and division is pretty much autonomous at least regarding its work organisation, the different divisions and business units have pursued such changes at different paces and are at different stages of development. Such deep

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[1] The relocation of indirect tasks into the core production work has been an increasing trend since the eighties and has taken place primarily in areas such as quality control, maintenance and industrial engineering (Jurgens et al. 1993).

changes in structure necessitated more fundamental changes in the culture of the company which are still not present. The company is in a state of continual or 'adaptive' change (Child 1984, p.238), as during the case study many changes in formal structure were taking place. These essentially involve area and product diversification (Child 1984). In July 1997 the Systems UK centre (responsible for business units in the UK) was dismantled and employees were given new job titles and moved to other units, as the re-organisation aimed to structure all European units on product lines.

This change process has been triggered by external market conditions since the late eighties. The markets have been changing rapidly, and BICC's biggest customers are the utility companies in the countries in which they are operating. As these are becoming privatised, they are increasingly concerned about price performance rather than technical performance. This customer change of focus forced BICC to become more competitive on price and costs. Many of the sites, particularly the ones that have been hit by significant changes in the market of their product, are still focused very much on cost reductions (Springett 1998). Furthermore, privatisation of the utility companies also led to an expansion of the range of products requested by customers.

"So there is even less opportunity to standardise and less opportunity to give a rigid set of parameters which people can perform their day-to- day activity. Now that does mean that people had to become more flexible in terms of reaction" (Financial Controller).

These external factors contributed indirectly to the need for employee empowerment, by discouraging standardisation and a rigid work framework.

With these conditions serving as the background for empowerment in the company, we now turn to discuss the way empowerment is perceived and the main reasons for its promotion.

5.2 Empowerment in BICC Cables

As is expected with a complex and "loaded" term like empowerment, our research revealed many different definitions and understandings of its meaning in the organisation. Nevertheless they all revolve around the same fundamental principles. This is even more significant if one takes into account that in most business units there has not been any formal change initiative specifically aimed at empowerment, but rather the latter is seen as an inevitable result of downsizing and delayering.

Empowerment is generally perceived as a positive organisational direction, and it is primarily regarded as devolving decision making and other responsibilities to the lower levels of the organisation. The organisational desire seems to be to mobilise employees not just to operate the line or perform a specific set of tasks, but to take action when things go wrong without waiting for instructions from a manager.

> "Empowerment is all about encouraging the individual to take more responsibility for himself, to make decisions for himself, to be much more proactive in developing his role to the benefit of the company rather than being re-active" (IS manager).

The strategy in the words of another manager:

> "[...] is to try to get people to think at a level that they are not just coming here to follow instructions to the letter but they are actually trying to get them to participate in suggestions, continuous improvement and really that fits together with the Total Quality journey which we commenced some 10 years ago" (Financial Controller).

However empowerment is a double-sided coin as noted in Chapter 1; not only does the organisation have to consciously delegate authority and responsibility to lower levels, but it also has to get people more interested in assuming this responsibility. If one of the two dimensions is not present, then empowerment cannot be successful. Our discussions in BICC, revealed that empowerment is believed to be in the interests of both the company and the individual, thus ensuring that the two above dimensions are both adequately addressed.

Empowerment is firstly seen as a more effective way of running the plant, since the allocation of decision-making responsibility at the level of the organisation which is closer to the problems, enables a speedy solution.

"From a personal viewpoint I believe that decision-making should be made at the lowest level of the organisation which is closer to the problem, and perhaps a nice analogy [...] is if you see a snake you kill it. Now clearly if there is a problem, it can be snuffed. If the manufacturing of a cable is going wrong and it can be seen at that time, then the individual, the machine driver should be empowered to actually take some action, not hold his hand up, report it up and say 'I've got a problem', by which time it's moved further down and you've got a larger amount of re-work, or by the time it goes up the tree to the brain and back down again, it's too late" (Financial Controller).

By empowering operators to actually take some action to solve a problem instead of merely reporting it, the company gains from reductions in bad work or scrap or lost production hours. There also seems to be a clear correlation in the minds of people in BICC Cables between employee job satisfaction and better results for the company:

"the happier the guys, the better it is for the company" (IS manager).

"In fact that [empowerment] isn't a bad thing [...] it is in the interests of the company and I think in the interests of the individual" (IS manager).

Still empowerment is not promoted just to make employees happier, but it is seen as a means for achieving the goals that each site has set; whether that is better performance, cost savings, process efficiency or customer satisfaction. Some factors however seem to have steered the organisation towards empowerment.

5.2.1 Reasons/rationale behind the encouragement of empowerment

In the last decade, most business units have experienced significant pressures from downsizing and delayering. The need to fulfill rising customer demands with fewer staff brought about enlarged tasks and responsibilities for employees.

"Now if you are downsizing a company, clearly the people left behind are doing more and have more responsibility" (IS manager).

In trying to maintain equal or even better performance though, the organisation had to unlock the potential of every person in the organisation and not just depend on the remaining managers. Decision making

responsibilities have been either passed down from supervisors and foremen, or have been integrated into employees' roles by adopting responsibilities that traditionally belonged to other functions. Such developments also meant that there is a need for first-line managers to deal more with strategy and longer-term issues, and only have limited involvement in day-to-day management.

These circumstances determine the character that empowerment has assumed in the organisation. They have also meant that empowerment is not pursued in the form of a formal, 'conscious' change initiative, as is also the case in many UK companies (see Chapter 4). Some people in BICC believe that this has acted as a barrier and that the company has to promote the culture change. It is debatable whether that is true considering the skepticism with which employees face the modern management "fads", and also the particular attitude that the sites have towards initiatives instigated at the Head Office. One senior manager noted that the "Group initiative" character would be the most potent barrier to a change directed at empowerment, since employees are often faced with change initiatives inspired by the latest management fads that fail to become part of a permanent management agenda (De Cock and Hipkin 1997).

However we believe that the move towards empowerment should be accommodated by holistic changes, so that the two dimensions, the individual and the organisation are both mobilised. Any attempt to encourage empowerment in isolated aspects of organisational life would soon confront the traditional organisational characteristics and would be unlikely to succeed. Evidence for the need for holistic changes in the organisation is given by the success of empowerment in practice in BICC Brand-Rex and in BICC Distribution Cable Systems in Wrexham, two sites that are renowned throughout the company for their efforts to empower employees.

5.2.2 Exploring empowerment in the organisation

BICC Brand-Rex pursues employee empowerment as a means to achieve their goal of excellent customer service. This involves quick response to

unscheduled customer demands, rapid changes in product range to suit the customer's needs and overall flexibility - a system which has been termed in the literature as 'time-based manufacturing' (Stalk 1988). In order to achieve speed of response and flexibility, the company has flattened its internal hierarchy: between the General Manager and machine operators there is only one level of management and a supervisory layer. Coupled with that, the establishment of flexible reporting procedures and chains of command depending on the particular issue at hand, speeds up procedures and overcomes administration bottlenecks.

The manufacturing operation is made up of two plants: plant A is dedicated to the manufacturing of one specific type of cable, whereas plant B makes a large variety of products in relatively small quantities. As plant A has a more stable production plan, there is supervisory presence only for 8 hours per 24 hour/day; the teams of operators practically manage the plant. Even when the supervisor is on shift, he:

> "is essentially planning the operation, making sure the materials are around, making sure that the personnel issues are looked after, that the work allocation is available, the documentation's there. [..] But the guys basically run the place" (General Manager).

As the effort to schedule and run Plant B is much greater than the one necessary for Plant A, there are always, at any one time, two supervisors per shift and each has a team of 30 to 40 people. Depending on the task at hand, operators establish teamworking arrangements. For example, in one particular area there are 5 operators looking after 16 machines each, working as a team: one will get nominated to wind the wire, somebody else gets nominated to change the drums and so on. Teamworking arrangements are not dictated by management, but are informal and decided by the operators themselves. In other areas of the plant though, management is actively encouraging operators to work together e.g. when machines are changing over from one product to another, and pay a productivity bonus if groups improve the productivity of a specific process.

This bonus is not an individual payment by results scheme, but a group benefit thus promoting team work (Agarwal and Singh 1998; Pfeffer 1998).

Performance indicators are regularly fed back to staff and customers are encouraged to make visits to the shopfloor, thus not only acting as direct recognition for a job well done, but also raising interest and creating opportunities for better customer service.

> "And that's part of the strength. Because when a customer comes through and says to them [the operators], 'oh, I buy your cable. And one of the problems we've had with your cable is sometimes, you know, you can't strip it, or your cable's a bit shinier than somebody else's'. And the operator can say, 'ah well, if you don't want it like that, we can change it" (General Manager).

There are also more subtle indicators that attest that empowerment is one of the ideals that the organisation is working towards; in the main entrance hallway there is a big poster on the wall that displays the photos of every single employee. The photos are not placed in the traditional top-down manner reflecting the hierarchy. Instead they are placed in alphabetical order with no job title after each employee's name, and with the general manager's photo between operators. Furthermore every person has an individual training programme which is put up on the factory wall. These signs communicate to employees the 'democratic' philosophy of the company and are quite important; they become particularly effective when they are coupled with structural changes, as in this case.

BICC Distribution Cable Systems at Wrexham presents another example of successful empowerment. Significant downsizing and a desire to cut the cost base and improve productivity forced the company to rethink work practices. Coming from a traditional UK industry background with:

> "lots of grades on the shopfloor, lots of arguments about overtime, extra little payments for everything. Lots of foremen and people to tell you what to do" (General Manager),

they seem to have turned around the way they work. With only two layers now between the General Manager and the machine operators, the organisational hierarchy has been drastically simplified (they used to have nine layers). The operators now work in self-managed teams; a total of 9 teams per shift. During the day shift there is one process manager per 3 teams, while for the remaining 16 hours every day there is only one manager on site. Each team has as a leader a cable-maker, not a supervisor.

However what appears to have really enabled the empowerment of employees to succeed, was an agreement to abolish overtime, which was introduced in 1991, at the same time as the move to simplify the number of grades.

> "So we've actually only got three grades of people, three levels of pay on the shopfloor. And there's no progression. Everybody gets exactly the same. That helped to change the 'not my job' attitude and increase flexibility. But we also had to really get rid of overtime, because in this business people would generate overtime. To increase their earnings, they would find ways of making sure they were going to work the weekend. So that had to go. And that's been extremely successful" (General Manager).

Now everybody is paid a monthly salary which incorporates an allowance for weekend work up to 250 hours a year. The "committed hours supplement" is fixed and employees receive it every month whether they work at the weekends or not, and thus the incentive is to complete all the schedule and achieve production targets during the week, so that they do not have to come in at the weekend. This change in the reward mechanisms ensured that employees have a personal interest in minimising machine breakdown, lack of necessary raw materials etc., as they delay production. Recent research confirms that aligning employees' personal objectives with the business goals instead of treating them as a trade-off, can help improve work practices and business results (Bailyn, Fletcher et al. 1997).

> "You get people coming in on a Saturday afternoon to make cables for free, because they've already been paid, and then ringing their friends up and saying, "don't bother coming in, I'll stay on and I'll finish it". [...] I thought that's pretty impressive" (Finance Director).

Coupled with the above, communication was enhanced, as much more information about business performance was passed to employees and they themselves were much more interested in finding out what their workload would be. Workers are involved in the planning meetings which never happened in the past and they basically run the plant. Since workers saw that management was not putting more pressure on them, and they did not work all of the 250 hours weekend work, a mutually beneficial relationship began to develop. In this way, employees now solve problems, are multi-skilled and can thus operate any machine on the shopfloor and are involved in continuous improvement. They have assumed many maintenance

responsibilities, they perform quality control and are responsible for short-term organisation and planning. They receive the production schedule and then they have discretion within that schedule for how to organise things so they anticipate work and are proactive.

Moreover, management adapted the measurement and control mechanisms and demonstrate continually to employees how their objectives have a clear linkage to a specific goal for the business. This is a critical dimension for empowerment as it helps employees relate their contribution to the bottom-line, a connection which is difficult to discern in large, complex institutions (see Chapter 4). Thus their approach to empowerment is holistic and has freed the employee from the traditional structural constraints, but has also triggered interest in assuming more responsibility by relating business performance to personal interests.

5.2.3 Impact and progress of empowerment

Although not all sites have been as successful and as far reaching in their efforts at empowerment as the two discussed above, positive developments particularly regarding the organisation of work, were noted in most other units:

- Teamworking has been introduced to the majority of factories and BICC Cables was one of the six core companies that participated in the 'Teamwork in Manufacturing' project carried out by the Tavistock Institute and the Advisory Conciliation and Arbitration Service (ACAS) (Neumann, Holti et al. 1995). Some factories are more advanced than others in this direction, while other more flexible arrangements have also been introduced involving job rotation and job enlargement (Hackman and Oldham 1980). People frequently move between different parts of the operation. Similarly, some jobs on the shop-floor have been enlarged; the role of the machine minder/driver e.g., has been expanded by introducing maintenance and cleaning responsibilities which historically were delegated to works engineers.

- The role of people in the stores receiving goods has been enriched with inspection responsibilities, while considerable purchasing authority has

been afforded to employees at one site. The need for a buyer to sign every single purchase order was causing delays in the purchasing process. Thus it was decided that every employee can sign their own purchase order up to a maximum value of 500 pounds. This change gave more control and responsibility to lower-level employees, yet was not introduced in order to "empower" employees but rather to speed up the purchasing process.

- Various problem-solving teams have been set up in different areas of the organisation where shopfloor employees and managers work together to improve various issues.

- Quality teams were noted at one site, although as a whole, the company does not seem to be committed to total quality principles, despite their inclusion in the management agenda.

- Significant attention is given to improving employee skills and capabilities, through a wide range of training initiatives, from one-day courses aimed at giving an overview of the whole business to employees to signing up with Investors in People (IIP), to encouraging people to undertake National Vocational Qualifications (NVQ) on the factory floor. Apart from the actual improvement of skills though, the encouragement of training for further qualifications, can act as recognition and communicates to employees that the company values *them*, as well as the contribution they make to the business.

- In one division where communications between employees and management were particularly poor, they recently introduced a formal communication programme which will involve newsletters, team briefing sessions, works councils and similar activities. In the same division the Board of Directors were trained on performance management techniques:

"in terms of, establishing a culture, deciding what we want from our employees, deciding how we were going to get them on board [...], to make them accountable, to measure their performance against agreed objectives. But also to identify training and development programmes for them, to make them feel part of the process" (Finance Director).

Empowerment necessitates fundamental changes to traditional performance measurement as the measurement system of an organisation represents its commitment to its vision and values (Gouillart and Kelly 1995).

It is generally believed that individuals are happier with the new ways of working.

> "The more you devolve down to people, the more they - in my personal view - will feel necessary, required, needed [...] and that they are being recognised for what they do" (IS manager).

However there is one factor which should not be underestimated in the assessment of employees' response to empowerment; the fear of job loss. In many cases employees have very specialised skills and have been working for the company for many years. Therefore in case they are made redundant, there will be extremely limited opportunities for them to find employment elsewhere.

> "There will be job fear, you're afraid you are going to lose your job and that has helped to inject the change" (IS manager).

There is relatively a consensus on the fact that the organisation has not yet reached the level of empowerment it desires; however progress has been made and the process is continuing.

> "So there's been big changes, we've a long way to go, we're nowhere near where we'd like to be but compared to where we were not very long ago, it's a big stride" (Personnel Director).

The change process is far from complete and was taking place during our study and therefore this uncertain and emerging character of change poses difficulties in assessing the level of empowerment achieved, how successful the whole effort has been and even identifying the actual changes despite the proclaimed objectives of the company. This dynamic state though, we believe is an advantage of this case, as the most valuable experiences can be gained at this stage, and not when the process is 'over and done with'.

On the whole, we found that BICC Cables is quite progressive in terms of empowerment and management practices in general, especially in comparison to many other manufacturing firms we studied. Nevertheless, the company appears to be following a rather 'ad hoc' approach to the encouragement of empowerment. Some sites are definitely more advanced than others; this is expected when one takes into account the decentralised

way of running the company. Even so, the more successful implementations of empowerment seem to have more to do with the specific circumstances at these plants and less with the general direction that the organisation is providing. We found that there is a lack of a clear, common direction for empowerment coming from the broader organisation. This does not necessarily have to take the form of a change initiative - since as we discussed previously such an attempt could be met by resistance - but it could be a policy in a broad sense. Nevertheless a detailed examination of the most effective means for empowerment is beyond the scope of this research, and we now turn to the role of IS in the company.

5.3 Information systems in support of empowerment

As in most large, contemporary manufacturing organisations, information systems have come to be an essential element of the work practices of BICC. Numerous systems and applications are used in every part of the organisation. We can discern two broad system categories; on the one hand there are the desktop-type packages involving word processing, spreadsheets, electronic mail, groupware and electronic communications, while on the other hand there are the systems applications that support the main functions: financial, manufacturing, personnel, sales and production operations. Significant investment in IS appears to have been made in finance/accounting systems and in sales order processing systems, personnel and purchasing systems.

5.3.1 General IS context

Over recent years there has been increasing investment in IT and the systems used range from the traditional ICL mainframes to networks, PCs, all types of software and applications to the latest communication software like e-mail and Lotus Notes. There is a clear move from mainframe systems to client/server computing using application packages. IS are increasingly being opened up to more users within the various sites, with site networks being established, while a wide area network connects all the UK-based sites. An

international electronic mail system has greatly facilitated internal communications and has had a significant effect on the way people work.

The structure of the IT organisation is a hybrid with a central Information Systems department for all the sites in the UK Division based on two sites, Helsby and Prescot, and a few IS specialists on each manufacturing site. The central IS department employs sixty-five people full-time, plus ten students who are employed for a one year period as an industrial placement. The department also provides services to other sites that are part of Cables Limited as opposed to the UK Division. The services they provide range from PC network support (there are around 1,700 PCs in the company), Wide Area Networks and links and infrastructure into Europe, to the support of all manufacturing and mainframe systems. They also employ several software development teams mainly concentrating on the client-server systems and a few senior project managers and business consultants who are used particularly with implementation of larger-scale systems. The IS department sell their services internally and apart from infrastructure services like PC support which is charged on number of PCs and the use the sites make of the department on an annual basis, they charge actual time of service provision. Thus there is a pool of certain IS specialists that belong to the IS department and work out in the units on a project basis. Each unit also has a few IS professionals located on-site to support their specific day-to-day needs. Their number depends on the size of the unit, and while the larger businesses can afford to employ four to five IT people full-time, the smaller plants might have a smaller number on site.

Although the investment in IT has mainly focused on functions other than production, there is quite a lot of IT use on the shop-floor for various purposes. PCs are used for stock control purposes in the stores and, on the shopfloor itself, operators routinely use them for word processing, spreadsheets or for chart design and so on. Operators have been reported in a few cases to have written their own Excel routines to help them with either quality checking or short-term scheduling issues. On some of the more advanced processes PCs are linked to machines and, through IS, operators

can view and change their work-to list which comes down from manufacturing based on the orders from the MRP system.

In some factories, shopfloor terminals also record plant maintenance or work-in-progress. In the offices on the shopfloor sophisticated launching and scheduling systems are used. The interaction between shopfloor employees and IS is growing continuously: operators on some sites book the operation they have completed on the system themselves instead of filling in a job ticket which they used to pass to a clerk in an office to key into the system. They also report in the system any problems they had with these jobs. In other cases they produce and print out the work orders themselves, which is also a task that was traditionally done in the production office. A software system called 'Max' is used to process work orders, progress activities, control stocks, for Material Requirements Planning and such general activities in some of the divisions. Shopfloor workers at one site recently started using IS to book in the goods that are received and inspected at the stores. On another site a maintenance management system helps to connect the machine operators directly with the maintenance staff and the operators book the maintenance jobs themselves directly on the screen.

All these discrete functions appear to serve two fundamental roles that IS are called to play in relation to the specific production organisation of BICC. As BICC plants operate less on the basis of manufacturing efficiency (i.e. keeping the machines continually loaded and running) and more on the basis of criteria such as low operating costs, increased productivity, customer service and improved delivery performance, the management of production has become extremely complicated. Production is not stable and constant as in the Fordist model; uncertainty and complexity characterise the scheduling and running of the shopfloor. On a regular basis choices have to be made that disturb the master production schedule. An unexpected request can create a need to change the whole schedule. Such decisions mean that a customer might get less cable or the initial amount ordered with a delay. Managing such situations can only be done with the help of IS since the implications of each choice are far-reaching and complex. If we consider that such choices are

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made on a regular basis so the effects of one choice on the production schedule cannot be smoothed out in time, but rather feed into the next change of schedule, the role of IS becomes paramount in keeping control of the business. The second fundamental function of IS which is directly related to this, stems from the close interdependence of operations; in order to cope with the uncertainty and complexity of production, operations need to be tightly coupled (Kling et al. 1992). One transaction coming into a system needs to be seen across the whole business.

> "[What you want is] the same transaction coming into a system [to] impact across the whole business. [With] goods coming into a warehouse, [...] you want the storeman booking them on a computer, but the finance people want to know stock levels instantaneously. That's IT. So IT is the vehicle, the tool, to simplify and improve the communications of what's actually happening" (Finance Director).

IS are the only means that can help employees manage the increasingly complex production context.

5.3.2 The use of information systems by lower-level employees

From the above it is clear that information systems are an inextricable part of day-to-day working practices. But how well do the existing information systems support employees in relation to the different work practices that empowerment entails?

On a theoretical level, members of the organisation recognise that IS are an important support tool, essential for the successful operation of empowerment.

> "The ability to make decisions is limited by the availability of information. And the only reason I can make certain decisions as a General Manager is because I hold a few more of the pieces of the jigsaw. Other people in the organisation are quite capable of making exactly the same decisions, providing they've got the same level of information available to them. So, information systems help us push that information availability further down the chain, and therefore allow people to make exactly the same decisions which are basically common-sense decisions, because they've got the information available to them" (General Manager).

IS are perceived as a prerequisite for the progress of empowerment. This was clear in one of the divisions which is one of the worse off in terms of empowerment:

"[we are lacking] basic business understanding, business control, control of our process, control of information. The financial information is dreadful. [...] So the basic things are not right, so to think about talking about empowerment of employees is a nonsense. We're nowhere near ready for that" (Finance Director).

In sites that are more advanced in the encouragement of empowerment, IS are strongly linked to employees' tasks and responsibilities:

"We want them [employees] to make better decisions. So if they've got better access to process instructions, material stock levels, where the next job is in the sequence in the factory, then they will be better able to make those decisions. So they will be empowered. If at the moment it's only a supervisor or somebody in a planning office, or a material controller that has that information, then they will not be empowered. So without access to that information, I would suggest we've no chance of empowering them further. And [...] in theory the simplest way of doing it, is with information systems" (General Manager).

Therefore since it is accepted that IS are strongly related to empowerment, how are the existing systems in the organisation responding to the demands created by the changes in work practices? In the following we present the research findings focusing on the ways in which information systems support individual employees and not on the benefits they hold for organisational efficiency. We also present an assessment of the support that existing IS provide in relation to each dimension. In the careful study of the everyday reality of IS use in the organisation - particularly in the interaction between individual users and IS which is at the core of empowerment - we observed a wide variety of problematic aspects.

Information systems are found to support employees in BICC Cables in the following ways:

- they support decision making;
- they contribute to task automation and facilitation;
- they facilitate communication and coordination; and
- they facilitate information provision.

Support for decision making

The ability to make decisions is limited by the availability of information; traditionally information was only available to managers.

"The key role [of IS in empowerment] is the provision of the appropriate information to the appropriate persons to make that decision" (IS manager).

IS can often provide all the information that is required to make a decision far enough down the chain so that even employees at the lower levels of the organisation can make sensible decisions. As an example, one of the sites developed a system that informs workers on the shop floor of the availability of materials and advises them on their best utilisation in the various products. The information system provides a warning that by releasing a job to work for which not all the necessary items are available, the employee is taking some common materials away from another product which could be completed. Hence the information system provides information for other possibilities, other requirements and helps staff make better decisions.

The main role that IS can play in support of empowered employees is to support decision making through the provision of information. Two essential prerequisites of being able to make good decisions were identified: firstly, a person needs to be provided with the necessary information, and secondly he/she needs to be able to manipulate that information in a way that is meaningful to him/her. The analysis of these prerequisites for decision making in the company, in many cases shows the following:

Firstly, the person is often not provided with the necessary information either because his access to the systems is restricted by his narrow role, or because the system itself cannot provide the information he needs. For example, a planning system in one site is not capable of monitoring all the resources so it cannot inform an employee that they will run out of a certain item. Another issue is that employees often need information from more than one function. Most systems are functionally oriented and may not contain all the relevant information an employee might need to make a decision or assess a situation. In some sites, operators on the shopfloor do not have regular access to IS. They can only gain access to a system after placing a request with the IT manager. He then has to consult the manager of the employee to determine what parts of the information system the latter can have access to. So essentially the employee does not decide what data he needs in the system, his manager does. These procedures undoubtedly constrain the ease of

access and highlight how difficult it can be for shopfloor employees to use IS in some cases.

Secondly, another problem that was frequently noted is that many systems are not user-friendly so it is quite difficult for employees to extract information, especially from databases.

"As an IT function we still have some work to do on providing intuitive information" (IS manager).

Users face significant technical difficulties with databases:

"The concept of the user being able to write structured queries in SQL into the database is not as easy [...]. So this concept of the super-user who understands the tables and structure of the relational database is essential to be able to unlock that information" (Financial Controller).

Related to these are also interface problems: a very simplistic screen limits the flexibility of placing queries and so on, while a menu characterised by too much data and complexity was also found ineffective.

Decisions rely not only on the availability of information but also on the quality of this information. Regarding particularly the requirements of employees, data is often not presented in a simple, easy to assimilate, intuitive way that can be of direct value. Legacy systems, on old platforms like mainframes can provide large amounts of data in the form of very detailed reports, but users cannot easily get practical information out of them.

"I think we're still at the stage of having lots of data, but not much information, not presenting it in an intuitive way, often by the time it's analysed, it's out of date anyway" (Project Manager for Lotus Notes Development).

Another issue related to "good" information is that because of the tasks that empowered employees perform, they need up-to-date information so that they can react fast and quickly. The tasks that they do are different to those of managers. They do not want information to look at and think about and manipulate; their needs are more operational than strategic. So the type of information that the traditional systems collect is often not useful; the same is often true of the direction of information flow. The idea of gathering information from every part of the business and sending it up to the managers (information

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collection) has to be replaced or at least complemented by a flow distributing information downwards and sideways.

In order to be able to manipulate the information that is provided in a meaningful way to him, an employee needs to have the necessary skills and competence. There is a serious lack of IT skills among lower-level employees:

"their actual ability to use the software is only 20% of what the software can do" (IS manager).

Furthermore in order to be able to manipulate the information one needs a solid understanding of the entire process to see which part of the process each element of information relates to. This is fundamental for good decision making and thus essential for the successful empowerment of employees.

"Because each employee clearly would understand the role [they] play in their particular area and what their responsibilities are, but what they don't necessarily see is exactly what happens further down, why some of the things which they are asked to do are important to the overall business process" (Financial Controller).

The IS in the company though cannot provide the visibility, the whole picture of the process but rather promote a compartmentalised view since they are not integrated; rather there are separate systems for separate divisions and functions.

"I don't think [...] that we are really helping them [employees] to understand the overall concept that much better through the systems" (Financial Controller).

When managers use the existing IS though to support their decision making, this problem is not so grave, for managers possess a solid overall understanding of the process which enables them to assess the consequences of their decisions. However when lower-level employees are called to make similar decisions, this problematic aspect is aggravated.

Apart from information provision, IS can support employee decision making by providing specific decision making tools, such as planning tools for short term planning and scheduling purposes. Moreover IS have been often used in the company to automate some standard, repetitive decisions, essentially by introducing defaults or suggestions that the system makes. In this way IS alleviate a number of standard decisions on the one hand, but on the other

hand in many cases the technology has minimised the decision making scope of the employee. In using such systems employees only need to make a decision in an exceptional circumstance, while the rest of the time they merely accept the standard defaults, e.g. when entering an order in the sales system.

> "Now to a certain extent the system takes over, in that it will clearly identify an action, but the decision ultimately is then based with the individuals to whether that action is overwritten or goes forward" (Financial Controller).

When one considers the implications of having to make a decision only to overwrite a decision that the IS has proposed, it is clear that such practices in the long term diminish the decision making competence of staff and their sense-making and improvisation capabilities (see Ciborra 1996b).

Task automation and facilitation

The IS in BICC Cables support employees in their tasks, by automating dull, routine work and thus lightening their work load. They thus help save time on many tasks while simultaneously they allow employees to focus on more important aspects of their job. An example from the finance department highlights this point; as IS help cut down on the amount of time spent on financial reporting, accountants can concentrate more on financial management issues which they perceive as their most important and essential role. Apart from automating routine tasks, we see IS facilitating other aspects of employees' jobs. IS are used to support problem solving, as noted above, some employees were reported as having built Excel routines to support quality checking and short-term scheduling. Furthermore apart from decision making purposes, the fast and easy access to information that IS provide is essential for most tasks, ranging from sales employees determining a price for a specific order, to R&D employees. For example, a new Lotus Notes-based system provides up-to-date information on the various R&D projects that are running in every part of the company and supports the work of R&D staff by indicating whether anyone else is working on the same or a related project.

In some sites though the existing systems simply fail to support the ever increasing needs of employees. In the cases where information systems are

used for booking of goods received or completed operations, stock control, maintenance and for numerous other tasks, we note that it is difficult to keep the balance between support and the system actually 'taking over'. When one carefully considers the interaction between human agent and the information system, in many cases the technology imposes a tight direction on how things can be done. The way that IS are built - particularly in the manufacturing context - may constrain the worker limiting the range of options open to him/her.

> "For a factory operator if you are running a line you've got fairly detailed operating instructions and the degree of latitude on the part of the operator might be limited. But the fact that he has a menu-driven system, tends to direct him in a particular way and [...] you try to make these things idiot-proof, they aren't, because you're talking about potential cost of scrap or damage to the machinery whatever (Personnel Director).

The employee has to perform operations the way the system specifies and thus it diminishes his/her degree of latitude and discretion.

Communication and coordination purposes

Electronic communication systems have greatly facilitated communication and coordination of activities within the company. E-mail and Lotus Notes have greatly enhanced communication of employees across functions and hierarchical levels. Lotus Notes discussion databases are a means for employees to express concerns, discuss and debate issues. They also are a means to get advice which is particularly important with the dismantling of management layers which would traditionally have been the main source of such advice. Electronic mail can also facilitate information provision when direct access to the necessary data through the existing IS is not possible. E-mail allows requests for information to enable an employee to do something to be processed quicker. IS also support information sharing and act as an information depository between teams to support the coordination of activities.

However there are many managers as well as lower-level employees who are reluctant to share information. On the other hand although facilities such as e-mail can be used to speed processes up and support the simplification of bureaucratic procedures, there are strict rules in place that do not allow the use of e-mail for authorisation or other similar functions. Huber (1990) in

particular had predicted that the use of computer-assisted communication technologies would reduce the number of organisational levels involved in authorising proposed actions. Our findings suggest that this is far from being the case.

> "If there's an email system [it] does enable that chain and process to work better, but we have some fairly rigid rules which say that if anything is above a certain level of value or anything is of a significant level of importance then it must be proposed and agreed and communicated as a fundamental decision back down the chain" (Financial Controller).

Thus potential benefits in that sense are not fully realised.

Information provision

The provision of general information - not directly necessary for the performance of tasks or for decision making - can support employees in various ways. General information regarding business performance can support employees' understanding of the business, although it appears that this is not being successfully achieved at the moment.

> "Part of that empowerment is the understanding of the business, understanding of the numerate accountability, responsibilities, etc. So information systems clearly are a vital ingredient for that" (Finance Director).

Information raises questions and stimulates interest and can lead to suggestions for improvements.

> "[T]he more data you have available the more questions are asked and the more open the data is, the wider the sphere of access is, so clearly that generates even more demand for more information" (Financial Controller).

IS warn employees about forthcoming events and make them pro-active instead of reactive, which has positive implications for both the employees (feeling more in control of their work) and the company (less 'fire-fighting' situations which are usually costly and ineffective). Finally through, for example, Lotus Notes, IS feed back to employees performance results which may boost motivation but at least make employees more aware of their performance. In the Manufacturing and Business Excellence programme, a Lotus Notes database distributing the performance indicators to the people who were directly responsible for the improvement of these indicators allows total visibility of everybody's results and promotes comparison and possibly motivation. On a more practical basis though, the identification of units that

are achieving improvements in one area can help other units directly get in contact with them, and benefit from their experience.

Although access to data may stimulate interest and raise questions, most IS carry passwords that vary according to the layers of access, access procedures usually require multiple authorisations, and the "browsing" of information is strongly discouraged, as managers worry that employees waste their time on using IS and not on their core activity. Most managers seem unconvinced of the usefulness of IS for lower-level employees unless their use is driven by a specific requirement. Such beliefs are largely responsible for the fact that apart from supervisors, shopfloor workers usually do not have access to email. Many sites do not have links to the Internet while in others, access is tightly controlled.

Related closely to the above issues are the difficulties that the company is facing with data integrity and accuracy. IS people and managers frequently complain that users do not realise that the information they put into the systems has to be as accurate as possible. They thus often limit the ability of lower-level employees to input data into the IS. A similar issue appears when employees extract data from system applications to perform some analysis. Data in this sense can be extracted to a file and then a spreadsheet and employees can use the data for reports or to perform statistical analyses, but they are not allowed to input the new data back into the system for fear of data integrity. Therefore information that could be of value to other users remains with the employee that extracted the data from the systems initially and thus information exchange is limited. Such circumstances put barriers to the interaction between employees and IS and to information exchange and are undoubtedly constraining for empowerment.

Naturally a range of other problematic aspects regarding IS use and management were noted which hold significant - albeit indirect - implications for the role of IS in relation to empowerment. For example, some managers in the factories are inclined to use IT as a control mechanism. Some employees - as well as some senior managers - particularly those who have been

working for many years resist using IS. We also noted that the perception that IS can be of limited value on the shopfloor is prevalent in the organisation. All these aspects create difficult conditions for the role of IS in empowerment, but are rather peripheral to the interaction of the human agent with the technology which is the focus of this research.

5.4 Case analysis based on our structurational model

The case study reveals the wide range of problematic aspects involved in the use of IS in the work practices as these are shaped by the ideas of empowerment. These seem to pertain either to the systems themselves or to the broader interaction between IS and users. So why does it prove so difficult to 'get' the existing IS to support the new work practices? We suggest that the reasons lie in the fact that the interaction between employees and IS continually reproduces those deeper structural properties of the organisation which are against empowerment. The day-to-day activities of organisational members draw upon and reproduce the institutionalised features of the organisation; these structural features are essentially rules and resources. Although the encouragement of empowerment has affected some organisational practices, there remain rules and aspects of the distribution of resources in the organisation that are against empowerment. These not only informed the design and development of existing IS but are continually reproduced through their use and management. Hence the inadequacies in the support that IS provide to the new working practices are experienced because the interaction between employees and IS still reproduces those structural properties that constrain empowerment.

We use an example to illustrate our point: people were frequently found reluctant to exchange information, even though the necessary technological systems are in place.

> "[P]eople are reluctant to communicate. [...] It takes a lot longer to change people's thinking or the culture of the place [...] than to put the technology in to do it" (Project Manager for Lotus Notes Development).

It appears that the interaction between employees and the IS is influenced by people's attitudes towards the sharing of information. But what shapes these attitudes? In the use of Lotus Notes, for example, although the expectations are that employees would want to share information, in reality information that is closely related to a potential sale for their own business unit is not shared, whereas other, perhaps more technical information that is not closely linked to the bottom line is more easily shared.

This example shows that in many cases the technology is not the main issue in the support that IS can provide for empowerment; the reflexive, knowledgeable character of human agency and those structural properties of the organisation that in reference to this specific example promote competition among business units, are critical factors. Thus the interaction between employees and IS, whether it concerns system design and development or their use, is continually reproducing those institutionalised features of the organisation which are mostly traditional and not favourable to empowerment. The conceptual model developed in Section 2.4 addresses these fundamental concepts. Using the concepts of this framework we attempt to explain why the organisation is facing so many difficulties with the support that IS provide to empowerment.

5.4.1 Reproduction of structural properties

Regarding the interaction between human agents and IS we can distinguish two different types of social activities; those involving the design, development or introduction of IS in the organisation and those involving the day-to-day use of IS. These two sets of activities can also be differentiated based on the group of social actors they mainly involve; development or introduction of IS largely pertains to the activities of IT professionals, or people working in the IT function/department, whereas the social actors that are engaged in the use of the systems are primarily users and in our research particularly lower-level employees. We do recognise that users are involved in the development and introduction of IS, and that IT people are involved in the everyday use of IS by employees, but the primary interaction pertains to the two groups as

described above. These two activities correspond to what Orlikowski calls the 'design' and 'use' modes (Orlikowski 1992a) although we need to clarify that these two activities are discussed separately simply for analytic purposes and in real life are inextricable and strongly interdependent. Our aim is to provide an integrated analysis tying the development and use of IS into a single research task (Orlikowski and Robey 1991).

i) IT people build or introduce IS

IT professionals are deeply aware of the social rules that are pertinent to their organisation; they draw on the rules and resources that comprise the structure of their organisation and apply them in the design, development or introduction of new information technology/systems (Avgerou and Cornford 1993; Avison and Fitzgerald 1988). In this sense rules and resources are both enabling and constraining as they enable IT people to act but also determine what they do. IT people are also influenced by the material and resource aspects of IS - meaning that they cannot do everything they would like to because of the state of the art in technology, the resources available to them, and so on. Figure 5.2 depicts the structurational model as it applies to the design, development and/or introduction of IS; we term it the 'reproduction cycle' to emphasise that employees reproduce the conditions that influence and mediate their interaction with IS.

Structural Properties

Influence   Reproduce

IT People → IS
           ←

Interaction
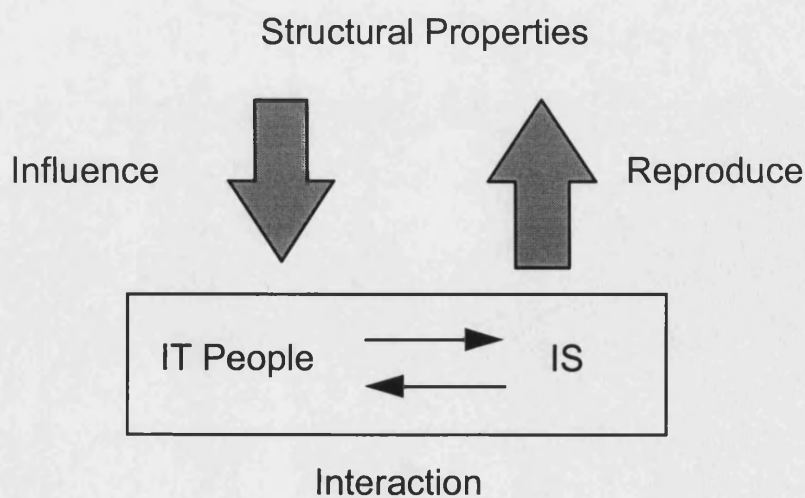
Figure 5.2: Reproduction cycle of IS design, development and/or introduction.

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The information systems in the organisation have indeed closely echoed the structural properties of the company through the years. BICC went through a fundamental reorganisation in the late eighties, which decentralised operations and made local managers responsible and accountable for their businesses. This was a very common trend at that time (George and King 1991). IT followed the changes closely and from a big central department which provided services based on mainframes they thrust towards decentralisation. As the structures of domination were affected by the move to decentralise, the sites were no longer content to depend on the central IT department and demanded their own computer facilities, a situation again faced by many organisations at the time (Land, Detjejaruwat et al. 1983). Consequently they moved the technology out to the units and developed their own systems. Thus IS were built according to the structures of domination and legitimation which were prevalent in the company at that time and which emphasised the autonomy and independence of each unit.

Since then, organisational changes within the divisions and the various units have continually informed the design and development of IS:

> "Because [our division], over a period of the last 10 to 15 years has changed its organisation every two or three years, and so someone's changed the system to try and reflect the organisation" (Finance Director).

Now specifically relating to empowerment, within each site - as is frequently the case in manufacturing companies due to the Taylorist principle of the division of labour, the organisation was, and still is, split up into functions. The use of computers developed separately in the various functional areas and each area built their own small system maintaining and reproducing their particular 'micro'-structures.

> "People from areas like the projects unit, the commercial unit, the accessories design, cable specifications these little areas, were developing and writing their own systems to help them, assist them in the job that they do" (IS manager).

The development of these systems though was done by teams of IT professionals, so the IS department itself was organised on a functional basis and would comprise a manufacturing systems team, a financial systems team

and so forth. The teams did not collaborate between themselves and they used to invent and develop bespoke solutions for the problems they were concerned with. The structures of domination and signification that discouraged collaboration and sharing and promoted individuality influenced the design of IS. Hence information was collected and contained in separate systems that did not communicate and therefore could not share data. Thus even within each site, there exist many diverse systems that each contain different sets of data. Through the reflexive monitoring of the effects that the possession and control of information holds, agents reproduce the structures of signification and domination that influenced the development of the IS. Even with the recent introduction of new systems, various groups, such as the finance people and personnel, disagree with the integration of systems across the various functions.

"Personnel I think would be very unhappy if they would mingle into everybody else because of security and the political issues, so they have a separate area" (IS manager).

Thus the IS department are influenced by the institutionalised features of the organisation that hold strong divisions between functions and reproduce these structural properties in their design and development of new systems. In this way, the inadequacies of information and the fact that employee access to information is constrained by function are due to these conditions. As employees now often need information from more than one function, many problems emerge in the interaction with the existing systems which are unable to provide all the necessary information.

IT people were also influenced by the structures of domination expressed in terms of the organisational hierarchy, in matters regarding access. The access an employee can have to IS:

"[...] depends how high you are in terms of the structural administration. If you are a supervisor or a shop floor employee in the stores area, you don't need to know about the accounts and there's no advantage to you to know accountancy software, personnel software, cable design software [...].But if you are coming up to supervisor level, now he needs to know about production, production planning and be more involved when materials are being moved round [...]. Now he needs more information, so we give him access to more information" (IS manager).

Thus, the fact that employee access to information is constrained by hierarchical level is due to the established structures of domination which developers embed in the systems and which are reinforced through the use of the systems.

Information systems were also mostly developed within sites to gather information from the shopfloor operations and the other functional areas of the factory, and deliver it to management who would coordinate and control the manufacturing process (Bedworth and Bailey 1987). In designing these systems, developers drew upon the existing structures of domination and reconstituted them in their development activities. However as noted above, employees now need information for their activities and the bottom-up direction of the information flow often proves inadequate:

> "It's information that's out in the manufacturing arena, not necessarily information that's sitting on my desk or someone in the Finance Department's desk. It's sending the information out where it's really happening. [...] So if you've got your cells, if you've got your teams, then they need to have information. And that's not sent down from Finance at the end of every month, two weeks into the next month. It's looking at it today, for today" (Finance Director).

The traditional structures of signification also maintain that employees are - and only should be - interested in their narrow tasks and nothing more:

> "[...] if there's a menu with seven fields on it of information and the guy is only interested in three we can take the other four off so we just leave him with a very simplistic screen [...] All the other information although very relevant and important in other areas is not important to him" (IS manager).

However this type of design can only but reinforce the limited interaction between employees and IT (employees will not be interested in something they do not even know is there) and in this way, the organisational feature that serves as a medium is also the outcome of the design activity. This obviously has constraining implications since in empowerment the boundaries between what information is interesting or useful to the individual agent are reconsidered and the provision of general information is strongly encouraged (see Section 1.4.2).

On the other hand, employees are very aware of their differential access to the system and are likely to interpret it in a different light to the IT people:

"In Max there are many menus but they [IS department] have taken out the ones I don't need... the bosses in the offices over there have access to more menus" (sales office employee).

Thus the menus of the IS act as a code of signification which implies that the more menus you have on your screen, the more powerful you are in terms of the hierarchy.

Finally regarding the lack of IT skills that were identified as a serious constraint to IS support, there is a deeper issue underlying the apparent problem:

"[...] what we failed to do is to recognise some of the dangers of deskilling jobs as opposed to reducing the number of people by enriching the job. We've got a guy on the line where the technology has taken away the judgment he used to make, and what we haven't done is that we haven't got the technician running the line. What we've actually got is a guy that when something goes wrong he can stop the machine. [...] What you actually want him to do now is not just operate the line but [to take action] when things go wrong" (IS Director).

The desire mainly to cut costs led the organisation in the past to reduce the number of necessary employees and thus to automate processes. This was coupled with the desire to standardise operating procedures to achieve the same product and quality every time, and many manufacturing organisations like BICC embedded the knowledge that operators possessed into IT (Ehn 1988; Zuboff 1988).

"Well that's a different environment than the old situation where it would be in the operator's head and each operator would do things differently so you'd get three shifts all operating the same machine and they all do it differently" (Personnel Director).

In following this direction, developers built into the technology the operators' interpretative schemes (the rules reflecting knowledge of the work being automated). The unintended consequences of this activity though was that it led to the deskilling of jobs which was continually reproduced through the interaction of operators with the technology. Therefore the problems noted in Section 5.3.2 with the diminishing decision making capability of staff and the limited degree of latitude that employees often have in their interaction with IS that automate their tasks, are due precisely to these embedded conditions.

Naturally, the state of the art in materials and knowledge as well as the available resources for the development of IS constrain what IT professionals can do and influence the final product. For example, since the company cannot afford to pay a lot for software development, the IT department tends to favour solutions 'off the shelf'. These frequently might not have a user-friendly interface, and this could lie beneath the interface problems noted in Section 5.3.2.

ii) Employees use information systems

In and through their day-to-day activities that involve the use of IS, employees reproduce the conditions that make these activities possible (Figure 5.3). The structural properties act as both medium and outcome of the activities involving the use of IS. In the interaction between employees and IS, actors use and appropriate the systems under continual reflexive monitoring. However, IS enable or constrain their activities because of the structural properties that are embedded and reproduced in the design and introduction of the systems (see Figure 5.2). In this way the two reproduction circuits feed into each other.
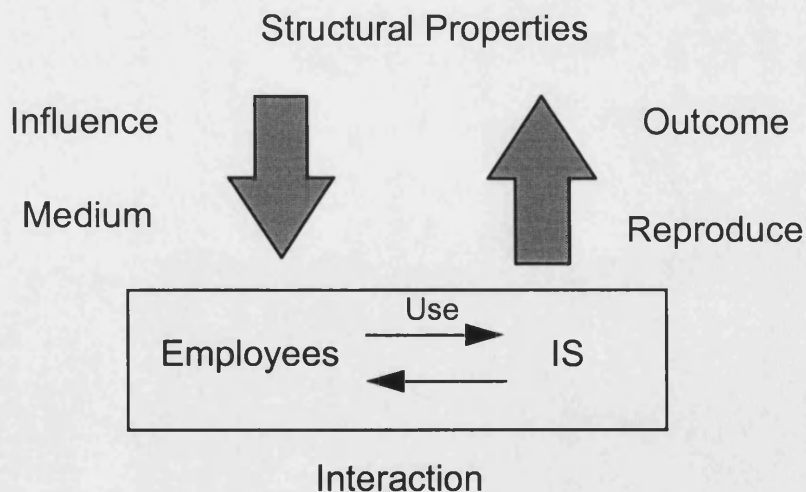
Figure 5.3: Reproduction cycle of IS use.

Employees appropriate IS as they use them and incorporate them in their daily work practices. In using and manipulating technology, they reconstitute the structural properties that recursively organise their activities. Through

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reflexive monitoring they appropriate and modify their interaction with the technology. We can see instantiations of their reflexive monitoring in occasions where they resist rather than totally adopt the technology. For example, in discussion databases, actors were found more than willing to share information regarding technical and manufacturing issues, but do not share information when it concerns opportunities for sales:

"[...] if I've got some technical information, I'm quite happy to share it with somebody. Whereas if I've got a lead on a project or something that will bring a million in, I may not be as keen to" (Project Manager for Lotus Notes Development).

In another instance, employees at the various sites refused to input information in an IS because there was a feeling that the Head Office was trying to gather information from the units. Agents engage continually in reflexive monitoring but it becomes more evident when they oppose the interaction with the IS.

Routinisation is a very important dimension in organisational reproduction and anyone who has ever worked in a manufacturing environment will surely agree with Giddens's emphasis on the concept.

"Routinised practices are the prime expression of the duality of structure in respect of the continuity of social life. In the enactment of routines agents sustain a sense of ontological security" (Giddens 1984, p.282).

Routinisation contributes to agents engaging less in reflexive monitoring during their interaction with IS and thus frequently leads to a reification of the employee - IS interaction. Although agents constantly engage in reflexive monitoring and can resist or react to their use of IS in many different ways, we observe in BICC - as in most manufacturing contexts - a reification of the conditions guiding the agent-IS interaction. This is also strongly related to the characteristics of IS as such, and the limited understanding that workers possess about them. Thus the interaction between agent and IS becomes reified and detached from the human action that constructed it, "it becomes endowed with thing-like properties which it does not in fact have" (Giddens 1984, p.180). This is very true particularly of the way lower-level employees accept the IS in BICC.

The traditional structures of legitimation which maintain strict divisions between individual employees' jobs are reproduced in IS which prevent employees from accessing information that is not directly relevant to their narrow job specification:

> "The other problem we have I think is that traditionally manufacturing systems are hierarchical, therefore you have a role. If you step outside your role that's his job, so you might find that your buying department will be a bit upset if somebody from the testing area is saying 'this supplier is taking 15 weeks to deliver these, I think it should be 10. I know a supplier up the road who could do it in 5'. Now we've got cross-boundary problems and we start building friction rather than be a nice happy ship. So I am not sure whether even if you gave 'well, there's all the information you can surf around and look at it as long as you like', I am not sure that there would be an advantage" (IS manager).

Therefore the limited access to information that is a serious constraint to the support that IS provide to employees is determined by the traditional structures of legitimation. Their interpretation on the level of action constrains employee empowerment and prohibits the wide dissemination of information that could stimulate employees to propose an improvement.

On a similar line, even if employees have wide access to information and they do come up with some suggestions for improvements, it is likely that they will not be able to implement them due to a lack of both authoritative and allocative resources. Thus the existing structures of domination pre-determine the usefulness that information can have for employees and justify their prohibition to wider access:

> "[...] because people would be wasting time perhaps looking at things that he isn't going to be able to change, or that isn't the right way to change it and he isn't doing what he really should be doing" (IS manager).

Unless such critical structural constraints are dealt with, one cannot expect employees to actively engage in solving problems and improving processes.

One aspect of authoritative resources relates to the ability to coordinate human activities. The distribution of authoritative resources in the organisation was made according to hierarchical levels as is often the case. Therefore managers possess more authoritative resources than employees, and the higher up the hierarchy, the more authoritative resources a manager has, while lower-level employees are generally lacking authoritative resources.

This uneven distribution of authoritative resources is maintained to such a degree that employees are not even provided with the understanding of how their work fits in with the tasks of their fellow employees and into the entire process.

This distribution is undoubtedly a prime element of the structures of domination and is a significant constraint in empowerment, but it is also reflected in the design and use of the IS. As noted in Section 5.3.2, in order for employees to be able to manipulate and understand information, they need to have the whole picture of the process. The IS in the company do not allow workers a broader view of the process which they form a part of.

> "[If a departmental manager needs] a new product manager's menu, he requests that through the Systems Department. And all I do there is to make sure they're not trying to get anything on there that shouldn't be theirs. [...] You want to make sure you haven't got a situation where, because you reduce the numbers to such a extent, that you've got somebody that can do all the functions effectively, of an opportunity for doing something naughty" (IS manager).

> "We don't give him [the employee] totality; we don't give anybody totality [of the process]" (IS manager).

This deliberate 'compartmentalisation' of the view that IS provide to employees is also a result of the tayloristic principles of the division of labour into the smallest possible, discrete activities. These have guided IS use in the past; on some sites still, when staff on the shopfloor complete an operation, they fill in a job ticket and pass it on to a clerk in an office who keys it into the system.

> "There are parts of their job roles that have never been shown to them [employees]; the information that he has been reporting on a piece of paper was going into the computer system, has been done for ages, he's never seen it. No one has ever shown him" (IS manager).

Thus the indirect or limited interaction with IS continually reinforces this compartmentalisation which hinders the employee from seeing how his individual contribution affects the whole process and the final output to the customer, an understanding that stimulates interest and encourages employees to take initiative.

There is a further point that stems from the inability of IS to provide a view across the organisation to employees. When in empowerment employees are called to make decisions with broader implications, they are frequently unable to understand and assess these adequately. Thus the problematic support that IS provide to employees in relation to decision making, reproduces the structures of domination by legitimising managers as the only agents capable of decision making.

> "[B]ecause the people out on the floor can't necessarily see what's happening to service the customer's needs, it's not possible to leave it to the guy out there to basically plan the operation" (General Manager).

Apart from this though, the lack of view across the organisation that characterises IS reinforces the structures of domination in another more indirect way:

> "[I]f the storeman has a bad day and books the wrong material on the wrong code, he probably doesn't see the implications of that at all [...] because he's only seeing a very small part of the whole, whereas in the old days he did his job, he booked the material in and sent a piece of paper. The finance person got the piece of paper, and said, 'oh silly man's put the wrong code on. I'll change it because I know he really meant this code'. You take that away by systems, you've actually got more risk of implications going wrong. Now then you need senior people vetting information. [...] The people within little boundaries don't really appreciate what the cause and effect is of what they do" (Finance Director).

As IS do not allow employees a view of the whole process and of the effects that an error they might make has on downstream operations, managers contend that they should be actively involved in the control of what employees do. Thus the problematic interaction between IS and employees is used to justify and legitimise managers' interference and reinforces their power, equally limiting employee empowerment.

Behind the bureaucratic procedures that follow an employee's request for access to a system, lie deeper issues of mistrust and conflict.

> "We leave it to the manager of the area to say what parts of the system people have access to [...] because otherwise I could give him carte blanche and he could be changing things, one, without being aware of the impact, but two, perhaps to be difficult, or he maybe an unhappy employee and wants to ruin the system" (IS manager).

In and through the access procedure, the agents involved, the functional manager, the IT manager and the employees requesting access reproduce the structures of domination that informed the setting-up of the access

procedure in the first place. We can contrast this to the access procedures that are established in one of the divisions that is actively encouraging empowerment; there anyone can log onto their information system and there are no passwords protecting any data. This is influenced, but also partly reconstitutes a very open culture they have, which promotes the sharing and wide dissemination of information. Nevertheless this attitude was clearly an exception in the organisation. Employees believe that the company as a whole does not have a very open policy about sharing information.

"In my lifetime here some people will not give you any information whatsoever, and they have this sort of secretive of 'need to know' type of basis" (IS manager).

Finally, the way that IS have been developed and used in the company specifies a standard direction of interaction between the individual employee and the IS. Employees can extract data from the system but are not allowed to put the original data or any data they might come up with back into the IS (we are not referring here to simple data entry like booking-in of goods received, but to the results of data analysis). This really reflects the traditional, anti-empowerment codes of signification of the organisation that support the idea that the employee has nothing of value to add to the IS and thus to the organisation. This notion, which is also closely related to the established structures of domination, implies that employees can only be 'information consumers' rather than 'information producers'.

5.4.2 Transformation of existing structural properties

In the same way we can explain most of the difficulties that constrain the support that IS can provide to employees, the 'collecting' direction of the information flow, the unavailability of up-to-date information, the lack of skills, the problematic interfaces and so on. The existing IS seem in many cases inadequate to support employees in relation to empowerment, essentially due to the reproduction of the institutionalised features that constrain the operation of empowerment. Still the research also revealed some instances where the interaction between employees and IS seems to have transformed rather than reproduced aspects of the structural properties that constrain empowerment.

These merit further analysis which is carried out in this section and re-examined in Chapter 7.

For example, the way in which employees use Lotus Notes, suggests a different role of IS in empowerment. Lotus Notes is seen as very useful in the company because it can store and disseminate semi-structured and loosely structured data, and its introduction was mainly intended to enhance communication among the units. However in this process:

> "you get this discussion going - different levels, senior levels, junior levels - across the organisation. So commercial [information] was very much the commercial people talk to commercial people, the finance information is more by accountants talking to accountants, but with things like Notes what you are getting is the tools and the mechanisms to talk to anyone in the organisation that has a common interest" (IS manager).

An unintended consequence therefore of the use of the particular system seems to be that people in various hierarchical levels communicate and discuss issues. The interaction between employees and Lotus Notes seems to cut across the traditional hierarchy and thus transforms the institutionalised channels of informal communication and structures of legitimation that essentially only permitted communication on a horizontal axis (namely between employees on the same hierarchical level or within the same function). Naturally we must not forget that it is the agents that decide to participate in the discussions, otherwise the capability of the system would remain unused.

In the development and use of systems based on Lotus Notes technology we observed a further few examples where the interaction between human agents and IS transformed rather than reinforced how the structural properties of the organisation are perceived on the level of action. A system called the Blue Book was introduced as a database of all the research and development projects that are undertaken by the different technology centres throughout the organisation. Once a year the Technology Director at the Technology Centre located at Helsby, used to collect in all of the proposed projects for the coming year from all the units across Europe and compile all the information into a big blue book,

"[...] and then send multiple copies out to other Technology Directors, where my guess is that it collected dust on the Technology Director's cupboard. **So the guy doing the research and development didn't really have access to this.** So he didn't know if anybody else was doing either the same or related. And certainly didn't know how to contact them or anything" (Project Manager for Lotus Notes Development).

Thus an IS based on Notes was built to promote the sharing of information on R&D activities and to encourage communication across the organisation. The need for dynamic information and more tight coordination was also a main objective of the exercise.

Even when the new Notes-based system was introduced, employees assumed that it was going to continue to reinforce the structures of signification and domination that informed the distribution of the literal "Blue Book" because:

"it's always, the systems we put in are for head office to get information from the units" (IS manager).

There was so much skepticism that in the first year, IT people had to type all the project information in by hand; no business unit would contribute to the database. As employees started though to realise that the new system was not solely targeted at the Technology Directors but could also support them, they welcomed it:

"[T]hey've seen that it's a two-way process. It's not an information collecting thing, it's an information distribution thing" (Project Manager for Lotus Notes Development).

Although the main (intended) goal of the system was to promote communication and information sharing among the various business units, the implementation of the system had some unintended consequences. The interaction between human agents and the IS affected the uneven distribution of resources between the Technology Directors and the employees that perform the R&D work and the structures of signification, by indicating to R&D employees that they are entitled to receive the information directly, because they are the ones that perform the basic R&D work. Thus in this situation, we can suggest that the particular way this system is used helps to transform instead of reproduce the traditional structures of domination and signification that constrain the empowerment of the R&D employees.

Another example can be found within the Manufacturing and Business Excellence programme. This is a process of collecting monthly figures from each of the units that relate to manufacturing and other key performance indicators. The process required the use of the existing management accounting software to collect the figures from all the units in Europe to the Head Office in the UK.

> "[A]nd that was a one-way process. So once a month [...] the relevant people [were] giving information to the accountant, the accountant would type the figures into these accounts and all the data would be consolidated up to Head Office" (Project Manager for Lotus Notes Development).

After the data was collected at the Head Office, it was compiled:

> "into a huge spreadsheet which was then e-mailed out to everybody, and people couldn't load it because they didn't have a machine big enough, and all sorts of [problems]. And, you're sending this 3 or 4 megabyte file in e-mail to many, many people, every month. It was a nightmare, both in terms of the manual intervention required and the actual bandwidth that they were using at the network. [...] And except for the Head Office, it wasn't helpful for the units" (Project Manager for Lotus Notes Development).

Thus, even though some information was sent back out to the units, the lack of resources on the part of employees (in the form of the inadequate PC) confirms, in the eyes of the employees, that the exercise was really meant to provide data to the Head Office and reinforce the existing structures of domination.

When a new Notes-based system was introduced to solve the technical problems that plagued the old process, it also unintentionally served to transform the structures of domination and signification. The collection of the figures in the Notes database enabled the move of the process away from the accountant and into the hands of employees, the teams who were directly responsible for the performance indicators. This communicated to them their important role in the process. It also affected the structures of domination regarding the role of the Head Office:

> "Before it was clearly me giving information to Chester. You know, big brother up there" (Project Manager for Lotus Notes Development).

The new system provided total visibility, allowed everybody to see everybody's results and in this way its use was seen to be transforming the traditional structures that determined that employees did not have to receive performance information, a principle which is detrimental to empowerment.

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Coupled with that, another Notes database was created to allow people to identify performance improvement projects that are running in the company, to report against them, to discuss and debate the issues. The database contained information on the various projects, on who was running it, who to contact, what the expected benefits were and so on. This wide dissemination of information and ability to communicate, enabled employees from all parts of the company to see the improvement projects which were before only known to the relevant managers:

> "that again was seen to be a good project, because it was a distribution of information, not so much as one way" (Project Manager for Lotus Notes Development).

However, what is most interesting is that the new database affected the structures of signification in a way favourable to empowerment: it replaced the spreadsheet full of numbers that was of little use to employees, with an interpretative scheme that provided practical information on the improvement projects that was much more valuable to employees.

> "Numbers are horribly meaningless really. You know, what really is meaningful is, I've got a problem with this criteria, I need to improve it, what are other people doing. So that's something much more tangible that people can actually get some benefit out of" (Project Manager for Lotus Notes Development).

As another example, through Lotus Notes and e-mail, employees who have to face problems and do not have a supervisor to turn to anymore can seek advice elsewhere.

> "So whereas before, what you would have is an engineer working in a factory and the only place that he could actually turn for advice was really up to his management or maybe to his colleague, now he doesn't have as many colleagues because our factories are much leaner than they used to be. Going upwards he might find that he's not actually working for an engineer who's as aptly skilled as he is anymore, since he is reporting to somebody who is multi-skilled. He will have to use the technology to provide the communication across the whole of the business to other engineers with similar skills who have tackled similar problems" (IS Director).

In this way the interaction between agent and IS instead of reproducing the traditional structures of domination it rather transforms it, as the employee can now have access to advice from sources other than his superior. BICC's rigid culture traditionally discouraged an informal process of mentoring (Dirsmith, Heian et al. 1997). Therefore the mentoring process was confined to the hierarchical relationship between employee and supervisor. The use of the

new IS transforms this dependence and has interesting implications for empowerment. As Dirsmith, Heian et al. (1997) showed the mentoring relationship can be a powerful mechanism of interaction with hierarchical and control aspects:

"mentoring confounds the centralisation of power and thus illustrates the duality of social relations" (Dirsmith, Heian et al. 1997, p.23)

Furthermore, IS can distribute data on the shopfloor and can enable operators to monitor their own performance and make computer-produced charts about scrap levels or product delivery performance or improvement group activities. With older systems, data were channeled upwards and similar performance indicators were calculated by managers and might have been posted on notice boards or communicated verbally. With IS, workers can work on the data directly and do simple analyses on them. Therefore the use of IS in this way transformed the structures of domination and signification that meant that their superiors should be the ones to monitor their performance.

There is another example where the interaction between the employees and an information system transformed rather than reproduced an element of the rules and resources that organise this interaction. On one site, if they take an order for an item and they do not have enough raw materials to cover the manufacture of this order, the sales order system triggers an information note into the cell that is going to actually produce the order. The cell workers get notified as soon as the Sales Department get the order electronically, rather than having to wait till they got some report at the end of the week, or an MRP1 (Materials Requirement Planning) sheet that told them that they need to purchase the materials needed.

Similarly, in the case of a major order the manufacturing cell might have known that a potential big order might be on the way, but they would have to wait till somebody decided to go, once the order came in, to tell them and this could take days. With the new IS they can get a note to inform them of the demand as soon as the order arrives. This just-in-time notification enables them to plan when they need to start production of that order, and affords them better control

over their time and resources. The information delivered by the IS also enables them to be proactive rather than wait passively for the supervisor's instructions. They can expect the order and that makes them feel more in control of the process.

Therefore the interaction between IS and employees in this case transforms the authoritative resources that workers have by allowing employees in the cell to coordinate their efforts better; before they would have to rely on the supervisor to let them know the order was coming. This however, seems as an unintended consequence of the electronic notification. The latter was introduced to speed up the production cycle, and the reflexive monitoring of managers revealed that it could also be used to eliminate excuses:

> "[...] also it takes away an excuse as well. It was an excuse to say, well, I didn't know that had happened. Somebody made that decision, but nobody told me. Yes, you did, you got a note telling you. If you chose to ignore it, that's up to you. But, you know, we told you effectively that that's happened. You can wait and let the machine take other courses and do things a week later" (IS manager).

Finally, on another site a maintenance information system was introduced for better communication and quicker response, but the use of the new system showed them that they did not need the maintenance supervisor anymore.

> "[W]e've got a maintenance management system. [...] Our tradesmen actually get the jobs off themselves. [...] We've got rid of the maintenance supervisors. So the actual maintenance people get their own jobs off the list" (General Manager).

Therefore the interaction between the system and employees transformed the traditional structures of domination that guided the relationship between maintenance tradesmen and their supervisor and promoted their self-management.

The instances noted above suggest that transformations of the BICC's structural properties are triggered - to some degree - by the interaction between agents and IS. These transformations are analysed in more detail in Chapter 7.

5.5 Summary - Conclusions

This case study described the way employee empowerment has come about in BICC Cables Ltd. and the support that existing information systems provide in relation to it. The ideas of empowerment seem to be well understood by all levels of the company, but the different sites have made different progress in relation to them. This is not surprising since there has not been a corporate-wide, common change initiative for empowerment. Regarding IS, it is broadly accepted that they are an important tool for employees. Some IS were found closely linked to the successful operation of empowerment because they can support employee decision making, they can provide information, they can automate and facilitate tasks, and they can facilitate communication and coordination. Even though the company is mature and advanced in terms of IS practices, the research revealed some constraining factors that impede employees from making full use of the potential of current IS. The company has not initiated any specific changes in their IS due to the encouragement of empowerment. Our analysis suggests that the main inadequacies in the support that the current IS provide to employees are due to the fact that the interaction between individual employees and IS still reproduces the traditional structural properties of the organisation which prove mainly constraints to empowerment.

Nevertheless not all interactions between agents and IS in BICC reproduce its traditional institutionalised features. In some cases the interaction was found to transform rather than reproduce the organisational properties. The study of these instances suggests that IS can be involved in affecting changes to the rules and the distribution of resources in the organisation in a way that is more favourable to employees, and can thus support empowerment. In order to better understand these processes of reproduction and transformation, we conducted a second case study to see the form that these might take in another context (Miles and Huberman 1994).

CHAPTER SIX

THE CASE OF BLUE CIRCLE CEMENT

This chapter presents and discusses the second case study which was conducted in Blue Circle Cement, the UK's largest cement manufacturer with a market share of 47 percent of UK cement consumption (Blue Circle Industries Plc., Annual Report and Accounts 1996). The company has adopted a more comprehensive approach to the promotion of employee empowerment, but the aim of the case study was again to assess the support that IS are providing to employees on the production sites. The research was conducted in Blue Circle from December 1996 to September 1997 and involved various data collection techniques.

The structure of the case study is similar to that of Chapter 5, in order to maintain consistency. Sections 6.1 and 6.2 present the history and background of management practices that led to the current promotion of empowerment, with a particular focus on employee responsibilities, while Section 6.3 discusses the role that information systems play in relation to

them. As many problematic aspects are identified in this case too, the final part of the chapter attempts to provide an explanation for these difficulties based on the structuration model developed in Chapter 2.

6.1 Overview

Blue Circle Cement is an operating company of Blue Circle Industries Plc, the parent company of an international group of companies whose core businesses are the manufacture and sale of heavy building materials and heating and bathroom products. Blue Circle Industries is one of the 'top 100' companies in the UK (The Times 1000, 1996). The heavy building materials operations are located worldwide, while the heating and bathrooms businesses have strong positions in the UK and other major European markets (Blue Circle Industries Plc., Annual Report and Accounts 1996). Blue Circle Cement has eleven cement works around the country and employs approximately 2,200 employees.

In 1900 the Associated Portland Cement Manufacturers (APCM) was formed comprising the amalgamation of mainly Kent based cement producers. Through the first half of the 20th century APCM acquired building materials interests all over the world and in the 1980s proceeded in significant diversification. In 1978 the company changed its name to Blue Circle Limited, adopting its long standing Blue Circle trademark. In 1981 Blue Circle became listed on the London Stock Exchange as Blue Circle Industries PLC and was one of the original companies that made up the FT30 Index. The 1990s has seen a period of consolidation with the focus on three core business areas: Heavy Building Materials, Heating and Bathrooms. A primary objective has been to create and maximise value for shareholders from the existing asset base with a strong focus on cost reduction.

At present Blue Circle Industries' profits are strong and the company is forecast to outperform its sector (Walsh 1998). The company reported a strong rise in underlying profits before tax from £297.6m in 1996 to £342m in

1997 (Barrow 1998). Although Blue Circle Cement suffered significant pressures in the eighties and is still trying to cut costs, its financial position is improving (operating profit for BCC in the UK for 1997 was £68.1m up by 14.6 percent from 1996) (Blue Circle Industries Plc., 1997 Preliminary Results). In June 1996 the company announced plans for a capital investment programme in its UK cement works of £330 million over the next six years. It manufactures and distributes nine types of cement which are sold in bulk or in bags. Most of its customers are large building products companies like Readymix Concrete or Tarmac, builders' merchants, concrete products manufacturers (e.g. tiles) or construction and engineering companies.

Blue Circle Cement's organisation structure is decentralised in terms of business units (plants) with the Head Office playing a rather coordinating role. Where the Head Office does indeed possess a tight control over the various units is in relation to financial matters. The company has been focusing on improving its working practices since the beginning of the eighties, and places significant emphasis on the importance of its workforce:

"Blue Circle recognises that the delivery of value to its shareholders can only be achieved through all its employees contributing to their maximum potential" (Blue Circle Industries PLC, Annual Report and Accounts 1995).

With a new employment agreement signed in July 1997 and significant moves to transform organisation structures and empower employees, Blue Circle Cement presents one of the cases where employee empowerment is actively promoted as a company-wide initiative. The company is highly committed to the development and training of its workforce; nine out of its eleven plants have already received the prestigious Investor in People award, which links training and development programmes to meeting a company's business goals. Thus the company was deemed particularly relevant to this research. Figure 6.1 presents an overview of the site visits conducted in the study of Blue Circle Cement (BCC).
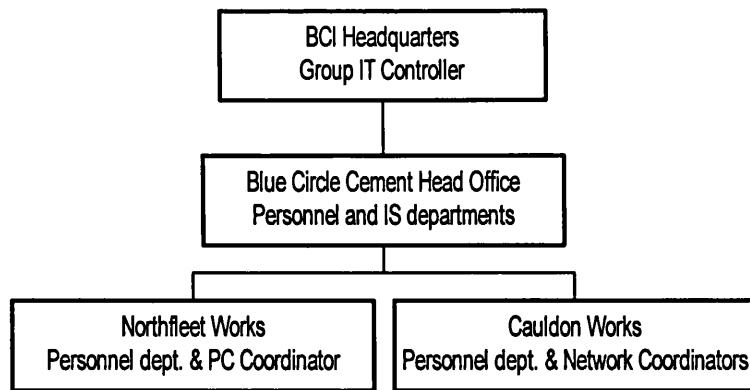
Figure 6.1: Site visits within Blue Circle Cement.

Table 6.1 provides an overview of the formal interviews conducted during the case study.

Name	Job Title	Company	Date
Dr Glyn Evans	Training & Development Manager	BCC, Head Office, Aldermaston	6/12/1996
Barry Dowsett	Personnel Manager	BCC, Northfleet Business Unit	16/7/1997
David Quinnell	Site PC coordinator	BCC, Northfleet Business Unit	16/7/1997
Mike Gibson	Personnel Manager	BCC, Cauldon Business Unit	24/7/1997
Elizabeth Burnett	Network Coordinator	BCC, Cauldon Business Unit	24/7/1997
Nick Wood	Process Control Engineer, Network Coordinator	BCC, Cauldon Business Unit	24/7/1997
John D Drabble	Business Information Manager	BCC, Aldermaston	28/7/1997
Caroline Seldon	IT Training Manager	BCC, Aldermaston	1/9/1997
Malcolm Middleton	Business Systems Manager	BCC, Aldermaston	1/9/1997
Roger D. Ellis	Group IT Controller	Blue Circle Industries Plc., Head Office, London	4/9/1997

Table 6.1: List of formal interviews conducted during the case study.

6.2 Empowerment in Blue Circle Cement

6.2.1 History - Background to empowerment

Up until the 1980s, Blue Circle Cement (BCC) was, like many UK manufacturing companies at the time, run by a traditional "command and control" way of management. The UK cement industry in the early 1980s was characterised by high manning and overtime levels, relatively low wages and low productivity. In Blue Circle Cement strict demarcations were prevalent

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between staff and hourly-paid workers, and even between process and craft workers. Numerous rules and conditions governed work and a history of very strong trade unions and 'macho' management styles created very competitive, confrontational relationships between management and employees. Additional payments for overtime and for work in adverse conditions were endemic within the entire cement industry. Although the 39 hour week was conceded in 1981, actual working hours usually exceeded 50 per week.

The company, as many others at that time, began experiencing increased business pressures from overseas competitors trying to infiltrate the UK cement market, which was already in steep decline. Their lower priced imports severely threatened the company's production, whose volume and price were static. In order to face the international competition, in the early eighties a major investment of £40 million was decided for one of the company's works at Cauldon, Staffordshire. A new highly automated computer controlled plant was built and similar updating and modernising investments were made at Dunbar works, in Scotland. These investments triggered a reconsideration of the traditional working practices and a programme of change was initiated at Cauldon works, which was subsequently mirrored at Dunbar. The change programme involved radical changes in working practices, reward systems and company culture which aimed to improve labour productivity while maintaining pay levels and reducing manpower. The new vision was formed in close collaboration with the five recognised trade unions and its key elements were:

- enhanced skills for employees with a reduction in the number of job grades, leading to greater flexibility of the workforce
- elimination of paid overtime and bonuses and introduction of a simple annual hours contract
- reduction in manning levels and labour costs

The new work arrangements centred around a new employment package called "Integrated Working and the Stable Income Plan" which was initially implemented at the two pilot plants and was subsequently rolled out to all the

other business units in 1985. The reduction in job categories from 14 to 3 created much broader job definitions and meant that each employee had to learn and develop new skills. This was coupled with a new teamworking approach which was essential to the development of the new culture. Individual skills and team training was extensive and spanned all levels: a senior managers' workshop, middle management and supervisors team training, team leader briefings and team building workshops.

Most importantly though, the incorporation of a fixed amount of extra hours in the annual hours contract eliminated overtime and the previous practice of prolonging the job to boost overtime earnings (Hutchinson 1993). Under the previous system, the more breakdowns occurred, the more overtime had to be worked and the more employees earned. The new package encouraged employees to ensure that production was running so that they could go home when their shift was completed. The elimination of overtime was also helpful in bringing down the demarcation issues between jobs. The attitude of "that's your job, not mine" was supported because it maintained the distribution of overtime among employees. If someone interfered and assumed responsibilities that traditionally belonged to another worker, he was also perceived as "robbing" him of his overtime.

Coupled with these developments levels of supervision were removed and the hierarchy was simplified. As a result of the combined changes in work practices and investment in new technology, productivity and efficiency increased dramatically. In 1989 and 1990 recognised output and performance measures made Cauldon the best performing cement plant in the UK, while production jumped to 750,000 tonnes in 1990 from 330,000 in 1985 with manpower down from 548 to 311. An independent review by ACAS revealed that employees had gained higher wages whilst each worked on average eight hours less per week. The increased skills and flexibility of employees, coupled with the end of demarcations, enabled workers to complete jobs faster and improved employee commitment and morale.

6.2.2 The 'Way Ahead' agreement and empowerment

This move was the starting point of the process which recently culminated in the establishment of the 'Way Ahead' agreement. The agreement was a result of a business process review exercise of the UK cement activities which the Group undertook in 1996. Four main problematic areas were identified in the review: sales and distribution, plant availability, administrative processes, and plant effectiveness - the final developed into the Way Ahead agreement. The review was initially carried out by a central team but as the principles of employee empowerment and involvement are beginning to become part of the culture of the company, it was subsequently delegated to the units:

> "So these things have been identified, it looks as though these benefits can be had, but let's put it out to the guys who'd do it within the business units, and get them to look at how that can further be developed within their unit to improve the way the various processes happen" (IS manager).

> "[...] with the 'Way Ahead' agreement [...] the ideas that have come up have been decided between a group of people, which involve mostly staff, as opposed to management" (member of IS department).

Thus the ideas of empowerment and the view of employees as partners appear to have permeated the way that the company goes about introducing a change initiative.

> "One of the aims of this whole exercise ['Way Ahead'] is to try to involve more people. I mean traditionally it has been the guys in the Head Office 'we know what's best for you. We will come and do things for you' but now everybody, or a very-very large proportion of the people are involved in these things" (IS manager).

The following section presents the 'Way Ahead' agreement and the fundamental role of empowerment in the new working practices. Before we present the agreement itself though, we discuss the fundamental concerns that served as reasons for the encouragement of this approach.

6.2.3 Reasons/rationale behind the encouragement of empowerment

There are a few fundamental conditions that made the organisation seriously consider the promotion of employee empowerment. Firstly there was a need to change management style; the combative relations between employees and management which were common in the industry proved detrimental for

the company. The changes in management style soon had to be followed by the empowerment of employees though:

> "as you move away from autocratic and directive management styles you have to be able to trust people, you have to allow them to make a lot of their own decisions" (Training Manager).

With the difficult market conditions of the eighties came a continual need to drive down manning levels. As people retired or left the company, they would not hire a replacement so the remaining employees simply had to do more. This is the reason why in the "Integrated Working" agreement, particular attention was paid to training and the acquisition of new skills which would lead to multi-tasking and flexibility.

Naturally the pressure to cut down on personnel costs also meant that many managers' jobs were removed:

> "All of the previous roles that managers used to have like giving feedback on performance, giving briefings and all of that can now be done in other ways, the briefings can be done by electronics, by IT, the feedback can come from colleagues, and so eventually we need less managers" (Training Manager).

At the same time, the technological advances enabled the reduction of staff within teams:

> "As time goes by, the technology has been changing and it actually means that the size of the team that is running the shift is getting smaller and smaller. [...] As the groups get smaller there's less need for supervision, and the whole idea really is that if the teams are small enough, then people manage themselves" (Training Manager).

Nevertheless there was a potent covert factor that hindered employees from embracing empowerment. Blue Circle Cement had been cutting down manning every two or three years. The terms and conditions of employment were such that if employees acted on their own initiative, if they empowered themselves to undertake responsibility and introduce corrective measures to prevent failures on plant etc., their efforts could be rewarded by reduction in manning. In other words if a plant was running better, then the company did not need so many people and would proceed with redundancies.

> "[S]o people would then say "now hold on, let's put a question mark, why should we commit ourselves to the continuous improvement process which ultimately could see a reduction in the numbers of employees?" (Personnel Manager).

6.2.4 The 'Way Ahead' agreement

Thus even after the introduction of the Integrated Working plan the "fear of making themselves redundant" was prominent among staff. The company needed to find a better way to mobilise the workforce. Trade unionists at shop floor level were initially contacted and it became clear that the fear of redundancies had to be dealt with.

> "The Business Process Review has shown the way forward - increasing commitment through removing barriers, greater involvement of everyone, better communications, delegation of decision making, focused training. [...] So how do we achieve the commitment we need? We believe we can do it by removing fear - by giving employment security. (BCC Chief Executive, quoted in BCC Business Matters: the Business Process Review newsletter, Issue 11, June 1997).

Over a period of two years they drew up the 'Way Ahead' agreement which is quite progressive in terms of British industry. Similar agreements are lately becoming increasingly common within manufacturing (see e.g. the much publicised dispute within Vauxhall Motors in the early months of 1998, (Lorenz 1998). The 5 year agreement will bring improved business efficiency and productivity in return for guaranteed pay rises and employment security. It is based on the principles of partnership, trust, involvement, communication and empowerment and was signed in May 1997 with four trade unions - the GMB (representing process workers), the Transport and General Workers Union (TGWU), the Amalgamated Engineering & Electrical Union ("AEEU") and the British Cement Staff Association. The extensive process of consultation with BCC's employees and trade unions made employees suspicious:

> "the suspicion was from the shopfloor, 'what are these union guys doing driving an agreement with management?', because that's going against old style" (Personnel Manager).

The open support of the trade unions though which were involved right from the start, is likely to ensure that the agreement will be successful:

> "This radical agreement [...] should be the shape of future industrial relations in the UK" (Allan Black, GMB National Secretary) (Blue Circle press release).

> "Together, Blue Circle and its employees have created a partnership approach, with each demonstrating a commitment to securing a strong economic future which benefits both sides. I believe this agreement sets the standard for British industry going forward" (Mel Barass, Regional Officer of the AEEU) (Blue Circle press release).

The Way Ahead agreement removes the rigid rules that govern working practices and the traditional divisions between staff and shopfloor employees. Firstly, it provides employment security; the company have agreed that there will be no compulsory redundancies and any reductions in manning will be on a voluntary basis. Any redundancies are strictly voluntary and employees are involved in defining the re-engineering of the remaining work.

Employment security is backed by a three-year pay deal which offers workers guaranteed pay increases to match increases in the Retail Price Index, plus 0.25 per cent. In addition, BCC will seek to roll the pay-deal on beyond the end of the three-year term and has also undertaken to work towards a 37-hour week by 2001. Thirdly, it harmonises the employment terms of the Company's staff, process and craft workers. Everybody within the company is now covered by one agreement except sales lorry drivers (for whom a similar separate agreement was signed in January 1997), senior management and executive grades. All employees are salaried, they are in the same pay structure, with the same pension rights and holiday entitlements. The pay structure is split up into six salary bands according to employees' skills and levels of competency and there is no difference in the salary that employees with similar skills receive if they are e.g. in administration or manufacturing. This new strategy is termed 'broadbanding' and de-emphasises titles, grades and job descriptions (Agarwal and Singh 1998). Such changes in paying structures are becoming more common in the UK (Hutchinson 1993).

In return the company commits to a programme to improve utilisation of all its assets. The agreement confirms the need for reorganisation or redeployment within BCC and employees are bound to cooperate. The company will use bench marking, activity analysis and team working techniques to improve business efficiency and reduce costs. Employees are called to strive continually to develop themselves and to improve the processes and products with which they work. They are expected to be flexible and adopt an attitude of responsibility and commitment.

6.2.5 Changes in work practices

With employment security guaranteed, employees can now engage in improving the efficiency of operations. This relies heavily on operatives spotting problems and dealing with them. Previously employees were generally responding to situations. What the company is now encouraging is that instead of a re-active mode, they should move into a pro-active mode, whereby they recognise what is required and take action under their own recognition. They are thus called to do what needs to be done rather than request it to someone else.

Employees are encouraged to take decisions themselves as to any improvements they would like to interject into the system without having to refer to a supervisor or a manager. As this will frequently entail expenditure, employees are empowered to purchase the necessary items through the stores up to a certain value.

For more far-reaching changes and concerns, at one site there are regular team meetings:

> "What we don't have now, we don't wait until a problem arises and then we have to discuss it. It's dealt with on a daily basis, we have regular team meetings [...] whereby shop-floor people put forward their concerns and their ideas and their suggestions on our improvements, and they talk about it at a very early stage and are encouraged to do so" (Personnel Manager).

This approach is particularly relevant to plant maintenance. Since the production process is largely automated, the human element is essentially involved in process control and equipment operation. The production goal is to maximise continuous running time, minimise breakdowns and unscheduled repairs and maintenance (Elsayed 1996). One of the biggest problems a cement company can have is breakdowns of plant equipment e.g. a breakdown of the kiln. These incidents are called 'unscheduled outages' and they can be very costly. One of the four main areas that were addressed in the business process review was plant availability and as a result a big project that looks at the optimisation of maintenance was initiated. The results have implications for both employees and IS:

"We believe the way to achieve that is to more effectively plan our maintenance load and it is to [...] listen more to the guys on the shop floor saying 'this has got to be done now' rather than follow the bureaucracy which can maybe slow down changes until it's too late" (IS manager).

The goal is to minimise unplanned stoppages and make any stoppage a planned stoppage. These changes in maintenance practices caused the most important change in manufacturing operatives' responsibilities and are behind the introduction of the two major information systems, IMM and IMS which we present in following sections.

For example, previously a fitter would be required to manually check that a bearing is operating well. If that bearing on a given piece of plant did show signs of malfunction, he would report it to a supervisor. The supervisor would then take what action was necessary to correct the failure or pending failure. Thus he would request a replacement for the failed item from the stores, and he would then ask the fitter to repair it. Some sites have already introduced condition monitoring on the bearing (which links actual plant usage to maintenance). The employee sets that up, monitors it, and takes whatever corrective action **he** thinks necessary, to ensure that the piece of plant does not fail within the near future. In case there is a need for repair the employee orders the item from the stores himself, withdraws it from the stores and carries out the repair, without having to refer to a supervisor.

Also functions such as engineering and production were integrated in order to bring down the divisions between strict responsibilities and to get people thinking more globally about their own goals and those of their fellow employees. With the 'Way Ahead' agreement, the numbers of grades within what was recently termed 'non-staff personnel' were reduced. In manufacturing there are now only two job classifications, namely manufacturing operative 1 and 2 and these correspond to only two salary bands.

Hierarchical structure and procedures

Changes in structure and removal of layers of management took place in the early 1990s. The work organisation that resulted from that initiative is still in

place across the company. For example, at the works, the team on each shift is managed by only one shift manager with no assistants or deputies. When the shift manager is not present the team literally run themselves.

"The one thing about the culture of Blue Circle that I've noticed since I joined, compared to my last company is that they have very little management.[...] the structure here is a lot flatter" (member of IS department).

The removal of layers of supervision has positive implications for the allocation of decision making (e.g. approvals, authorisations). However there are some drawbacks:

"What we have now in all departments is somebody who runs that department, then a senior person and then everybody else. That has its disadvantages as well as its advantages: the advantages are that everybody is a party to what's going on, they are all at the same level, so that's good. The disadvantages it has is that it doesn't allow any progression in terms of career development to get to the top, it stifles that level there. What you do get is you get a lot of guys applying for just the one position whereas [before] they may have had two or three steps before they get there" (Personnel Manager).

Despite the flat structure within the sites, Blue Circle Cement is still facing problems with the bureaucratic procedures that have been established over the years:

"we have still too much bureaucracy, where there are too many decisions that have to be passed up the tree for approval, whereas in fact all the management at that level does is rubber stamp it. There is never any question, they just rubber stamp it. So it begs the question well why are we doing this then? Shouldn't we empower them, shouldn't we give them the opportunity to make those decisions themselves?" (Group IT Controller).

In trying to move in this direction, the company is delegating budget responsibility to simplify the time-consuming purchasing approval procedures, where signatures are necessary even for small purchases. For example the overall engineering budget will be split up and each section engineer will have his own budget that he monitors, controls and is responsible for.

Other changes instigated by the agreement include the abolition of the clocking in procedure and the changing over of shifts on the job. Up until the coming into force of the 'Way Ahead' agreement in June 1997, every non-staff employee had to clock in and out when they came to work and when they went home. Managers and staff did not have to though. As another move to demonstrate trust and partnership in practice, the company abandoned the

clock-in system. Employees have the freedom now to manage their time as they wish and coordinate with their colleagues at the change of shifts without the interference of any manager.

The role of supervision and self-management

The role of supervisors and managers is also changing. An interesting point is that although some employees might have 'manager' in their title, they are not managers of staff, they do not have people that report to them, they are simply "managers of their own job". The importance of titles however is diminishing with the new agreement which covers all employees. Following on from the removal of layers of hierarchy in the early 1990s, the 'Way Ahead' agreement removes shift managers completely from the shifts. Shift managers were traditionally responsible for supervising the workers that were on their shift. The role of 'looking after' the shift is going to disappear and the people that held the shift managers' jobs previously will take over a specific task and piece of work.

For the supervisors that remain their role is also changing:

> "a supervisor's role is one more of delegation rather than leadership, and coaching rather than dictating. Nobody stands and directs people to work. No, those days have gone. So his job is planning, delegation, communication, coaching, and getting the team to come up with decisions" (Personnel Manager).

> "Although there are supervisors, it should be more of a team-building, teamworking atmosphere. And I've seen that. I've definitely seen that as evidence happening at all the business units" (member of IS department).

At the works the company is currently trying to create teams that, rather than have a supervisor as team leader, chose the team leader amongst themselves. For example, at the paper sack factory at Northfleet works, four shifts work over a 24-hour period and each one has a staff supervisor. They are changing over to a five shift system with no supervisor and self-directed teams.

> "That's what we are really saying: "You come in and you'll see what needs to be done and you would do it. You will not have to relate to anybody to see if that's the right thing to be doing. We'll train you, we'll give you the skills to recognise what needs to be done and to be able to do that" (Personnel Manager).

Training

Undoubtedly employees need tools and skills to achieve these changes:

> "[...] we need well-trained capable people in order to empower them. If you don't have people with the intellect to be trained then it holds up the process" (Personnel Manager).

It is clear that in both the "Integrated Working" and the "Way Ahead" agreements, significant attention has been dedicated to training. For example in the establishment of the self-directed teams at the paper sack factory at Northfleet, employees that make up each team will go away for two or three days and decide how they will work, who is going to be the team leader, and set out the team rules (similar workshops had taken place at the introduction of the Integrated Working agreement).

Blue Circle Cement is committed to investment in training and development of all its employees and the acquisition of new skills is an essential element of the 'Way Ahead' agreement. The new job classification scheme in manufacturing links salary to the attainment and use of new skills and competencies as measured against National Vocational Qualification standards or equivalent. Progression from one job classification to another is based on the acquisition and practice of additional skills.

The implications of this move are indeed significant, if one takes into account the traditional company culture:

> "[...] until quite recently the jobs that people did were very physical jobs; there was lots of digging and shoveling and so forth, and so the culture of the company has really been not to value education greatly because the jobs themselves were quite simple jobs" (Training Manager).

Outcomes

The results appear very encouraging, although at the time of the research the new "Way Ahead" agreement had just been introduced. The new agreement, is expected to generate annual savings of over £10 million a year across BCC's UK plants. Improvements are noted both on a macro and a micro level: a general trend of improving indicators such as employee commitment and satisfaction were reported, while improved plant efficiencies, operating times and reducing costs demonstrate positive results on a macro level.

> "[W]hen you talk to people now they are much more committed than they have ever been in my experience within Blue Circle which goes back some 37 years. It's quite a dramatic change. I can actually see people being happier, they are more involved, they are not restricted in what they are doing either from a trade union point of view - because they weren't allowed to - or from a company point of view because we didn't want them to. They very much feel now a party to what's going on" (Personnel Manager).

> "People are very happy with the way it went, the ones that left wanted to go [...] and the ones that stayed now get very good salaries, so they're satisfied" (PC coordinator).

A partial indication of the way the workforce respond and how satisfied they are with their work, is absenteeism (Goodman and Atkin 1984; Matthewman 1983). At Northfleet the sickness absence rate at the time of the research was only 2%, compared to a 7% or 8% for British industry, and about 11 or 12% for employees generally (Seccombe 1995).

> "[B]ut I think the main thing is improved cooperation, and that's something that you can't measure. But when we want to do new things, people are now quite enthusiastic to take them on" (Training Manager)

In the past the introduction of anything new was met by suspicion from employees and with requests for extra payments. Now cooperation between employees and management has greatly improved as a result of the change in attitudes.

Difficulties/barriers to empowerment

These indicators are very promising if one takes into account that the profile of employees in Blue Circle Cement is quite old: the age base is people in their late 40s and 50s. It is also quite traditional in the sense that there are less than 5 percent women employees, which is quite normal though for cement industry standards. Change is still not easy for the company and cost reduction is a fundamental focus:

> "The company is very much along the lines of, 'we won't increase our headcount unless we really have to'" (member of IS department).

However taking into account the extremely traditional industry background and the long history of the company, the progress made has been significant. Nevertheless the process is far from complete and there are some issues that were noted as important barriers to the success of empowerment.

"The links between my effort, company performance and my rewards are very important for empowerment. If you have a large company you need to be able to break it down into small units that people can feel they are a part of and that they can really have some effect on. So I think in large companies we need to think about the way we base our rewards and that will have a lot to do with empowerment. So again we're not doing it now; we are still quite individualistic in the way we reward people. We have a merit system and people get extra money because they've been good and done the right things. I suspect that in the future we will be moving much, much more towards. team-based rewards, that there will be groups of people that get a reward together" (Training Manager).

A final point of interest is that many employees are shareholders who have joined the company share-save schemes. Thus they have a supplementary interest in ensuring that the company performs well.

"They [employees] feel a part of the company now, in as much that they themselves can join the company share-save schemes which gives them rights as shareholders" (Personnel Manager).

For precisely this reason many companies (especially in the United States) have introduced similar share schemes that serve to better align the interests of the company and its employees (Gouillart and Kelly 1995; Lawler, et al. 1995).

A further barrier to how empowerment could benefit the company is posed by the strict boundaries between departments and functions. Thus employees are empowered to suggest and implement improvements closely related to their responsibilities but are discouraged from interfering and suggesting how other people should do their job (note that exactly the same norm was evident in BICC Cables too):

"[...] staff are the world's best people to show the company where they're going wrong as well. And we don't do that. I mean, we could turn round to Personnel and say, oh we feel that you could do a cheaper option with your PCs. We couldn't go to Personnel and say that" (member of IS department).

6.3 IS and empowerment in Blue Circle Cement

6.3.1 General IS context

Quite recently employees have witnessed the introduction of many new IS and applications. Although computerised control systems have been in place

for more than a decade in the various works, lately - in particular since the summer of 1996 - significant developments in IS have taken place. Electronic mail was introduced, a company Internet site was launched in the summer of 1997 and a wide area network connected all the local area networks of the sites across the UK. A decision was made at Group level to standardise on Microsoft Exchange electronic mail software at the end of 1996; at the time there were only a few pockets of e-mail in the company, some of which were mainframe-based (Vowler 1996). A move to Microsoft Office was scheduled for the end of 1997, while Windows NT was scheduled for implementation before then. A new financial system is also planned for introduction in 1998 which will be more interactive than the one which is run through the mainframe at the moment.

The company's sales IS were rebuilt between 1987 and 1992. On the manufacturing side, the Interim Maintenance Management (IMM) system was introduced in 1994 at the various works. Building on that, a new system, the Integrated Manufacturing System (IMS) was being introduced at the works at the time of the research (summer 1997). Both IMM and IMS as well as virtually all main IS - the Human Resources system, financial reporting, personnel, payroll and sales systems - are all run through the IBM mainframe. The core of the personnel system is based on software on the mainframe, but a lot of personnel information is downloaded onto Dataease databases which are then run on PCs in the various Personnel Managers' offices. The Sales Information System deals with orders, goods dispatched, stock control, sales forecasting, market share, sales volume and EDI. The accounts receivable system, the accounts payable, the general ledger, the fixed assets system are all packages from MSA and are also run on the mainframe. IMS is replacing a system called Mable - Materials Management and Bought Ledger, which is being phased out with the procurement phase of IMS.

Regarding the production systems, there is not a single common system for all the plants. Some plants have central control systems, for example at Cauldon and Dunbar works. The central control systems at some plants are very old and date back to the building of the works, as they were installed

along with the process facilities. At Cauldon, in the summer of 1996 a new IS was implemented, called CIMS (Cement Information Management Solutions), developed by ABB. CIMS is also being implemented in the company's cement works in the United States.

Production scheduling systems are PC-based. A linear programming model is used for helping to decide which works should deliver to which part of the country, and PC-based operations planning models are used for identifying the best times to have a shutdown.

An attempt at a vehicle scheduling system was not successful, and another pilot implementation of the scheduling system will be carried out at one plant.

For word processing purposes, Perfect Office was used at the time of the research across the company and a move to Microsoft Office was scheduled for the end of 1997. This move was deemed necessary as Microsoft Office is compatible with the IMS system, and it also can link in with the new finance system that is going in shortly.

At the various works, PCs are connected via local area networks. Most PCs are located in the offices surrounding the process, from the control room to managers' offices and engineers' offices, the stores and so on. The local area networks contain more 'local' information, for example various forms that need to be filled in, policy handbooks, etc. However, access to the mainframe is very well integrated with Windows: users can run systems that are based on the mainframe in the Windows environment. They will also be able to do the same in the Windows NT environment.

The IS organisation

There is a corporate IT department at the level of Blue Circle Industries and there is an IS department within Blue Circle Cement based at the Head Office in Aldermaston, near Reading. The corporate department provides services to BCC such as the provision of hardware, and ensures performance of each

system to service level agreements. The IS department of Blue Circle Cement is quite independent from the corporate department. It has a functional line into the Group IT Controller but is directly responsible to BCC. Corporate IT set certain standards, for instance they set Microsoft Exchange as the standard for email, and Microsoft Office as the standard for office systems. Projects are not developed centrally and each operating company decides on its own systems.

Numerous members of the organisation noted difficulties in the relationship between the corporate IT department and the IS department in BCC. The actual direction of the development and the overall IT spend is determined by BCC which sets its own targets, its own objectives and its own IT strategy.

The corporate department may query their decisions and advise their operating management and does have a 'say' when the introduction of a new system is evaluated. For instance corporate IT has a say in the introduction of the new financial system which has wider implications for BCC. They also set certain operating constraints since they are responsible for coordinating the IT resources of all the operating companies. In the UK the three divisions of Blue Circle Industries, Heavy Building Materials, Heating and Bathrooms are served by one centralised data centre. Figure 6.2 depicts the organisation chart of Blue Circle Cement's IS department.

Organization chart of Blue Circle Cement IS department
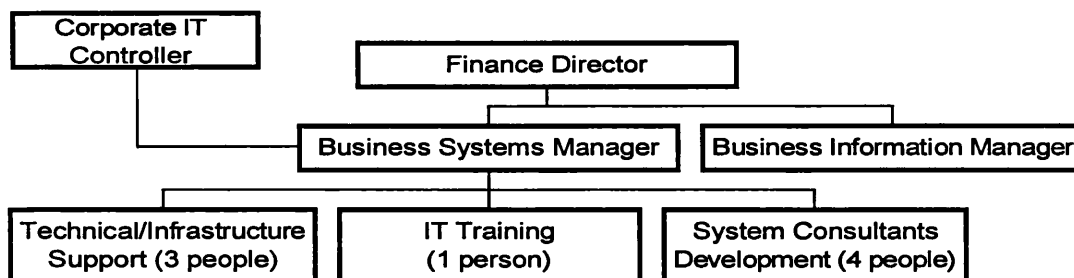
Figure 6.2: Organisation chart of Blue Circle Cement's IS department (source: interviews)

The IS department at Blue Circle Cement comprises a total of 11 people who are supporting 700 users. The department is split in two parts that look after

service (support) and development. The former supports the wide and local area network infrastructure, database administration and training, while the latter are responsible for the main IS of the company: sales & marketing, manufacturing, finance, human resources. At the time of the research, there was also significant activity in terms of communications and office systems. An IT professional is allocated to the development of each of the main areas (sales, manufacturing, finance and communications/office systems - HR systems are developed by the corporate IT department).

Consequently the IT resources at Blue Circle Cement are very stretched. The IS department manages to maintain systems in everyday situations, but when it comes to any significant development they need to be supported by contractors. The IS department is responsible for the main commercial systems especially the ones run through the mainframe. But as more and more smaller systems are run on PCs they tend to lose control of all the systems across the works. For example, various applications are being developed on spreadsheets on PCs without any involvement of the IS department. Regarding IT people at the sites, Northfleet works is the only plant that has a full-time PC coordinator; the other sites either have part-time PC and network coordinators or no IT staff presence at all.

The BCC IS department is undoubtedly facing problems with supporting the significant number of users with such limited resources. This situation is partly due to the fact that during the recession, the company cut down on personnel.

"The trouble is as we start to pull out of that [recession], there is always a certain moment of the lid taken off a pot and all of a sudden there are so many different initiatives going around that people feel fairly swamped. So I think - particularly on the IT side - we have a resource issue, which I think we are asking people to do an awful lot these days" (IS manager).

Another problem that aggravates the situation is that they are based at the Head Office away from the business units:

"[...] remote support and remote problems are also a very big issue to us" (member of IS department).

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In order to deal with these difficulties they adopt a structured implementation procedure which allows them to maintain some level of control, but which can be slow:

> "One thing that BCC try and do is implement in a structured manner, putting an awful lot of thought into the implementation and the training and the support that they're going to get for the aftermath of them getting it [a system]. [...] we're not going to start just sending it out because we wouldn't know where the problems are arising from then" (member of IS department).

The Integrated Manufacturing System (IMS)

Maintenance management information systems (MMIS) are usually implemented to support initiatives aimed at the improvement of maintenance practices (Hipkin 1996; Wireman 1994). Since effective maintenance is totally dependent on keeping track of what has already happened during operation of the production equipment, MMIS are critically important in capturing such data and transforming them into information which can be readily usable in refining maintenance intervention (Hipkin 1996).

The Interim Maintenance Management system (IMM) was developed between 1992 and 1994 and since 1994 it has been implemented at the various works across the country. The IMM system is a maintenance work-load control system and building on that, a new system, the Integrated Manufacturing System (IMS) was later developed. IMS links in with IMM, takes the maintenance workload and incorporates improved authorisation procedures, improved budgetary control procedures and attempts to procure according to the maintenance workload. Both IMM and IMS are IBM mainframe-based. At the time of the research the IMS system was gradually being introduced at the various works. The design of the Integrated Manufacturing System (IMS) predated the Business Process Review exercise but the system soon became one of its basic parts.

The IMS is being implemented in two phases. The first phase is based on a system on the mainframe as at the time they were starting development they could not find a PC package which fulfilled their requirements. Thus the

system was and still continues to be written in-house. Phase II will supplement the mainframe system with a package and will be PC based.

"The goal is to get everything down to the PC environment and through the report writing tools, through the integration with the familiar office systems that people are working with, to actually make it all much more accessible" (IS manager).

The IMS holds numerous effects for the company and its work practices and the objectives of its introduction were to improve plant performance and thus production output, to reduce operating costs through fewer and shorter shutdowns and ultimately to achieve a better understanding and control of the plants. One of the main features of IMS is the ability to do everything on screen. Where authorisation is needed, it can be done on screen, so it can be done from anywhere, and that shortens the time it takes for an internal procedures. Similarly the system can warn people when certain things do not happen as they should, which again helps to speed the process up.

The IMS system is initially linking procurement to maintenance (IMS phase I). The next step is then to link in with the process control systems so that it will automatically pick up plant usage. This will happen in Phase II of the implementation of IMS which will also result in the system being based on PCs. With basic maintenance that they are running at the moment, they tend to over-maintain because maintenance is carried out every month, regardless of how much a plant has been used. The next step is to go to condition-based maintenance and integration between the plant and the maintenance system. In such a case where there is time to respond to a deteriorating situation, maintenance is not carried out until the plant gets to that condition (Elsayed 1996). This is line with the concept of just-in-time maintenance (Patton 1994).

The role of IS in Blue Circle Cement

Information systems can serve different functions and have different impacts and benefits according to the part of business they are meant to support (Earl 1988; Farbey et al. 1995).

"[...] I think for a cement company particularly one shouldn't see necessarily IT as strategic. It may be critical but that isn't necessarily the same as being strategic. What that means is that the IT side supports the main business and in areas there can be

pockets where it can be strategic, but generally it is critical and supportive" (Group IT Controller).

The initial drive behind the implementation of IS in the company was to automate tasks so that employees can be replaced by computers (Farbey et al. 1995). Gradually the potential of IS to provide competitive advantage became apparent but is seen as most relevant to the manufacturing and sales functions which are the closest to the customer:

"I believe that in broad terms you think of IT as a triangle and at the top of the triangle I'd probably put finance systems, next point down I'd put things like payroll, personnel, pensions. Next level down I'd put manufacturing, stores and at the bottom level, sales, dispatch. The reason I say that is that as you go further down the triangle you come closer to the customer and despite what I was saying about overall things being strategic and critical, within that triangle I would say the top two are what I call critical systems, but you've got to have finance systems, you've got to have payroll systems but as sure as hell they don't differentiate you from your competitor. The ones down below, how you sell your product, invoice, discount, how you control your stores. If you get it right when you are dealing with your customer or your product, that is where hopefully you get competitive advantage" (Group IT Controller).
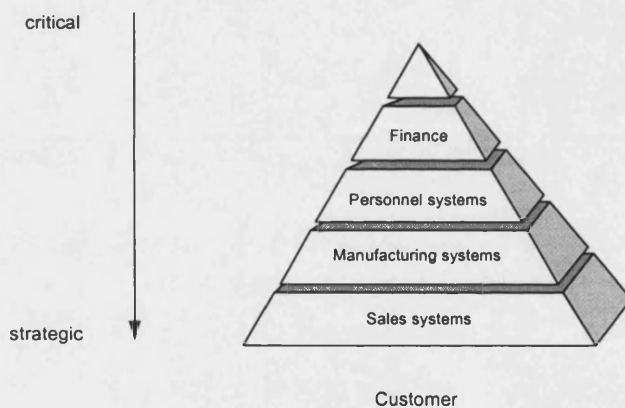
Figure 6.3: The role of IS in Blue Circle Cement (source: interviews)

These ideas (see Figure 6.3) are largely in agreement with the strategic role that IT and IS were found to play in manufacturing companies (King et al. 1988).

6.3.2 IS and empowered employees

In relation to empowerment IS are regarded as a supportive tool:

"I think the systems predominantly are there to speed the authority and to give authority further down the chain. [...] giving authority down the chain whilst making the management aware of the decisions which are being made" (Group IT Controller).

However it is also believed that IS can provide valuable support on an individual level:

> "I mean there are good reasons why they [shopfloor people] should be on the computer terminal, planning what they are doing, being able to see how often that particular problem crops up, whether perhaps the quick fix is not the right solution to this problem and it should be something rather more fundamental, which, OK, costs more money now, but will save money long-term. So there are good reasons why we do want to encourage the whole of the workforce to be keyboard literate and systems literate" (IS manager).

Employees on the other hand are also beginning to recognise the support that IS can provide to them:

> "A lot of people are really taking it [IS use] on board and they are really getting into it and they want more, you know they've got this and then they want, 'well can I have that as well?' Can you give me access to this? It's snowballing really!" (PC coordinator).

As noted in Section 6.2.5, the way empowerment is operationalised for employees in Blue Circle Cement revolves essentially around three elements:

1. Employees are called to continually improve the processes in which they work (spot problems and deal with them).
2. They are encouraged to move from a re-active to a more pro-active mode of operation (recognise what is required and take action on their own).
3. They are expected to be flexible and to strive continually to develop themselves.

We use these dimensions as the background against which we analyse IS support for lower-level employees. It is important to note that the focus lies on the ways in which IS support individual employees and not on the benefits of IS for organisational efficiency and effectiveness (in line with empowerment ideas). The empirical research revealed the following ways in which IS support lower-level employees in Blue Circle Cement:

- IS facilitate communication and information distribution
- IS enable better process and operations control
- IS simplify time-consuming internal procedures
- IS support decision making

Communication and information distribution

Firstly, internal communication is made easier with electronic mail and the local and wide area networks. For example, if a fitter is carrying out a repair and needs a specific item he can access the stores' PC from any nearby PC to see whether the item is in stock. These communication facilities are of particular importance at the works because manning is very low and the sites are geographically spread out; thus access to information via IS can save employees a lot of time.

The local and wide area networks have enabled the easy sharing and distribution of information to more employees. On each site's local network, there are certain files that are available to everyone, there are files that are available to selected groups and there are personal files. So when someone is typing a document, they can place it into the general file and make it available to everyone, something which was impossible before. The local networks are also seen as ensuring the provision of up-to-date information.

> "We are trying to tell them [shopfloor staff] 'forget the books, if you need information you can look at it there [the IS], if you want a phone number look at it in there, rather than the telephone directory, you want to look at some stock description, don't go to the stock books and look it up, look it up in there, because the big advantage of that [IS] is that it's current. Whatever is on there is current, today. You've got a print-out that was produced last week, it's a week old; it's not going to tell you what's in store now'" (PC coordinator).

Although the facilities to distribute information are present there exist many difficulties with passing information from one system to another. For example, information on the mainframe cannot be linked into the systems that run on the local area network. As an employee explained:

> "If I wanted to send that information to people, I'd have to print it off and then post it to somebody" (network coordinator).

> "If an engineer, wanted to send data from e.g. the financial system, how much they spent on number 2 kiln, the information is on the mainframe but he cannot just put that in a WordPerfect document or spreadsheet, put it on a LAN for someone else to look at. He would have to produce a report and then send the report to somebody" (PC coordinator).

The reverse is also true; e.g. if there is information on a LAN that someone has produced, it cannot be entered into the mainframe. Similarly, for some

sites information from one site can still only be accessed at that particular site and not from anywhere else.

The company is moving towards PCs being widely used across the works, but at the moment there is a technical limitation in the use of the email system. The system requires access to a relatively high specification PC which disenfranchises a proportion of the workforce who only have dumb terminals or no access to a computer terminal. Thus manufacturing operatives do not have access to email at all, although as we discuss further, PC unavailability is not the sole reason. In general though, PCs are not widely used by operatives; typically manufacturing operatives have access to the production control system, and to the IMS. For the operatives, the IMS is effectively the only information system that has affected their work practices.

There are numerous benchmarks, for example mean time between stops, market share, percentage of deliveries which are delivered by company vehicles, cost per ton-mile for deliveries, which can be used for comparison both within a business unit over time and across business units. They are produced by the various systems and reported by BIS, the business information system.

"The communication systems that we have within Blue Circle now allow individuals not to see only what's going on in their own business unit but what is going on in every other business unit" (Personnel Manager).

These performance results can promote a better understanding of site performance but can also boost motivation and interest. These are not available to everyone though. Performance results are open and available only for people at the higher authority levels. Employees that have access to the general ledger side of the BIS are treated as being 'insiders' as far as the company and its accounts are concerned, and there are also further access restrictions depending on function and role.

Similar issues of restricted access apply to the Internet where, at the moment, very few people within BCC have access. IS managers have access on a

machine in their area which is used by a number of people as and when they need it.

> "But we don't give general access to the Internet, because basically we think people waste time with it, and is all of that vast amount [of information], information which people need? I suspect not" (IS manager).

Better process and operations control

The change from a reactive to a much more proactive mode of operation across the shopfloor necessitates systems that will allow employees to carry through these changes.

> "What we are really doing is we are moving away from manual systems of checking into a more computerised system of checking and recording and action-taking base and logging whatever things need to be done" (Personnel Manager)

Distributed process control systems (Williams 1986), have been in operation at the works for more than a decade now. These and the latest more user friendly information systems such as the CIMS at Cauldon, have made information collection much easier:

> "A PO [process operator] sits up in the kiln control room and he's on the night shift and the alarm sounds. [In order] to get that information he might have to walk all around the site; with the system he can save a lot of time" (PC coordinator).

Interestingly enough, people in BCC also feel that computer-based IS are more reliable than manual systems. This corroborates one of Zuboff's findings regarding the continuous process industry (Zuboff 1988). This however has led employees to accept everything the information system indicates at face value and to fail to question its output:

> "I see people failing to question numbers. [...] People put in information [...] and they'll rarely at certain levels question what's coming out. [...] so I find that the older generation, I'm talking forty plus, to some degree are more likely to question information that's coming out, because they've had to add it up" (Personnel Manager).

The unquestionable acceptance of an information system's output can be problematic though because it presupposes a continuous correct and rigorous entry of data, which might not always be the case:

> "For example, we have stores with spares, number of spares, motors, everything else. [...] I have no doubt that the fitter will take a motor out, put in motor out. The system will fall down if you don't take that motor out off the shelf. And what we'll do is we'll sit here and we'll go, "we have three motors", and we then come to a maintenance day. But we've only got one, but the system says three. [...] They [employees] rely on this

entirely. But it's suspect because you might not have moved something out" (Personnel Manager).

The benefits of the provision of computer-based information relate to employees identifying problems and dealing with them before they grow:

"the implication is that systems would ultimately remove the fire-fighting that goes on in industry, and give people more time to actually manage their time, manage the plant and be more forward thinking and pro-active" (Personnel Manager)

Thus the provision of real-time information can enable better control of operations and processes. Employees can move away from a repair and fire-fighting situation to efficient management which will free up their time to take on more training, and ultimately contribute to the continuous improvement process on a day-to-day basis.

However the provision of information in an easy and helpful way is critical for better control (Hipkin 1996).

"[Y]ou can't necessarily download information from one application on the mainframe to another. [...] There is no easy way to actually download anything that is on the mainframe on QuattroPro or Paradox and make it something in Windows. You still have to physically type it in or cut and paste it. But with the IMS you can produce reports into Paradox" (PC coordinator).

"At the end of each month the stores do a breakdown of store stock items how much is mechanical, electrical, production, how much is quarry, etc., and that information comes from the mainframe. They get a report, they take this information out manually, and type it out into a QuattroPro spreadsheet, collate it and it produces a bar chart of your figures. What you'd like to do is for the mainframe to actually produce that report in a bar chart without actually doing anything else" (PC coordinator).

Support for decision making

Maintenance management IS can provide information on reliability and availability that was previously unknown and which is essential for decision making (Hipkin 1996). Employees working both in administration and on the shop floor are encouraged to make decisions through the empowerment process that they previously were not allowed to. These decisions are mainly related to process improvements and were not found to involve any other 'managerial type' decisions. Some of these improvement-related decisions will be a result of recognising from an information system plant performance and taking action to remedy any problems. These are not so much real-time responses to operational problems as noted above, but more decisions

resulting from a careful analysis and study of performance parameters. The information provided from such systems can also promote a better understanding and knowledge of the plant and the causes of its failure (Hipkin 1996).

As one example the CIMS that is used at Cauldon works has greatly facilitated data analysis and enabled a better understanding of the production process. CIMS takes information directly from the Distributed Control System (DCS) and presents it in a user-friendly Microsoft Access database. The system enables users to access and manipulate plant data through functions such as reporting, trending, statistical process control, tracking of alarms and process mimics (a display provides a plant overview showing current plant status and key figures at any time). The support for analysis and understanding of plant performance is thus greatly enhanced.

By building a database on all maintenance jobs carried out, the IMS will gradually enable employees to determine when they need to maintain a facility and what equipment they need for every job.

However significant difficulties were noted with extracting data from the mainframe; these are related to the existing standard report tools:

"[...] there are only certain set reports in the mainframe that one could use, in that if you wanted to know something obviously it might well be that it's produced quite a lengthy report just for a bit of information you need, you can't design your own reports. But with IMS you can, there are no reports in IMS, you take what you want, so that's more integrated. It puts it into a Paradox database and you can then put that onto a LAN and send that through the email if you want" (PC coordinator).

Similarly in some cases users complain that the information that is provided is not detailed enough and that the current IS cannot support 'tracing back' of operations.

"One of the things that I would like to be able to do is I get information every month which says how much has been spent against the cost centres that I'm responsible for. [...] but if I see a high number which I don't recognise, all I can do at the moment is go back to one of the people in the finance department and say 'what's included in this?' [...] What I want to be able to do is to get that on my screen and [...] drill down from that number down to the individual vouchers, individual invoices, whatever it might be, so that I can do that myself, I don't have to disturb anybody else, and I can get the answer quickly" (IS manager).

The inability of the IS to support this need is essentially due to their lack of integration and fragmented system structure. Although this need for 'tracing back' is not yet relevant to lower-level employees, it will surely become so in the near future as it is the basis for continuous process improvement.

On a deeper level though a concern was expressed that employees - not just process operators who regularly use the distributed control system - have incorporated IS in their job to such an extent that they tend to depend on IS totally. This becomes particularly evident for example when systems are down and employees feel totally 'useless'. (Concurrent findings are reported in the IS literature, see e.g. Orlikowski 1996b, p.34). Their over-dependence on IS though can create problems in the long term. They are frequently found unable to understand the task that the IS is automating and therefore this is likely to be unfavourable for employees making decisions and exercising judgment.

Simplification of internal procedures

The new IMS system is meant to simplify internal procedures:

> "At the moment it's a fairly lengthy process. The order form may be filled by somebody on site, gets sent to the main office here for the engineer to authorise, goes back to the stores, the stores input it, the order is printed, quite a lengthy job. The new system [...] which we are introducing now is basically the same, but it does away with the form" (PC coordinator).

IMS gives employees direct access to the stores' IS to order their own equipment. If the person who is placing the order has a budget that covers the order, he does not require any further authorisation. In a different case, someone with the necessary authority has to electronically authorise the order. In this way their request is speeded up.

Employees can bring up on the IMS tasks that need to be done and the system will show where they need to carry out repairs, what needs to be ordered from the stores and give them the capability to order it directly. This capability extends beyond the purchasing of commodities. The improved procedures on IMS apply to services, e.g. someone may wish to hire a

person, or have a specific job carried out, he can perform the procedure on the IS.

Nevertheless the need for authorisation persists and has been designed in the new system: if the person that raises the order is not authorised to raise one, then the stores will not see it until the relevant superior electronically approves the order. Only when the order has been authorised will it appear on the stores' computers, unless the person placing the order already possesses the necessary level of authority.

The company is very much intent on splitting budgets up, so that the overall engineering budget is split up by sections. Each section engineer should then have his own budget that he monitors and is responsible for. However the desire to split budgets up predated the capability of the systems and that has meant that expenditure needs to be aggregated at a level lower than the system is capable of producing. For example, the information system can produce figures for costs of maintenance for the cement mills, but it cannot produce figures against budget for maintenance for each cement mill separately. In one of the works though, responsibilities have been delegated to different people so e.g. section engineer A is responsible for mill 1 and section engineer B is responsible for mill 2, so the information system needs to be able to do the breaking down. Thus this aspect of the system constrains the operation of empowerment and at the moment it is necessary to record on spreadsheets rather than on the main system. The new IMS will support this as we see in Section 6.4.

Apart from the above though, the research located some aspects that are relevant to more than one IS support function and which seriously constrain the support that IS provide to employees. For example, small technical issues make it more difficult for people to feel at home and comfortable with the systems. Some systems conform to one set of mainframe standards for navigation, others conform to a different set of mainframe standards, while others conform to a Windows standard. Users are often confused as a result

of this lack of standardisation especially since they do not have a lot of experience with IT.

These difficulties cause some managers and employees to feel that their use of IS and computers is something which is peripheral to their main role and that could be performed by someone else. Concerns were expressed regarding the role that IS have come to play in employees' work.

> "What you have to do with IT systems however, [...] is that it doesn't overtake you, [it] is there as assistance to what you are trying to achieve. It doesn't overtake you to the [extent] that it's all consuming, that you spend all your time there and you lose direction a little on some of the things that you should be doing" (Personnel Manager).

This attitude towards IS is evident among both managers and employees. Other difficulties are emerging that are essentially due to employees' perceptions and assumptions of the role of IT and IS in their jobs (Orlikowski and Gash 1994). Quite a few shopfloor employees still see their role as being 'wielding a spanner' and not being responsible for the administration that's associated with their work.

> "[P]eople are saying well "why should I be expected to do this on a keyboard when somebody, a sixteen-year-old girl whatever, who has good typing skills can do it in half of the time. My job is keeping that piece of plant going, not getting onto the computer terminal" (IS manager).

These attitudes are aggravated by the fact that a significant percentage of employees are quite old, they are nearing retirement and do not wish to get involved in the new IT and IS:

> "there's an awful lot of people out there saying, well I don't want the Exchange, because I know I'm going to retire in six months time" (member of IS department).

There is an interesting debate on whether older groups of workers are particularly resistant to change and modern IT (Helliwell and Fowler 1994); the findings from this case seem to suggest that older employees are likely to be more resistant to the introduction of new IT compared to their younger colleagues.

On the other hand though, there is a different view from some employees, as is to be expected by the variety of technological frames usually encountered in an organisation (Orlikowski and Gash 1994). The capability to use IT and IS

to assist their work rather than being manually involved with things, seems to give some people a feel-good factor. This could be related to the past history of the industry where most tasks performed by workers were manual and staff and managers engaged in non-manual activities (Zuboff 1988).

It appears that staff are facing difficulties with the many changes and upgrades that they have been experiencing - particularly in relation to word processing packages. They find that they waste a considerable amount of time getting to grips with a new system which constrains their productivity and the support that the system could provide to them. Users feel uncomfortable with the continual changes and new versions of software and note that it can be just as disruptive to continually take little steps from one version to the next, as it is to wait and take a big step once. This can act as an inhibiting factor in IS use as employees lose their patience with the technology and cannot 'settle down' with it, which is absolutely essential in order to integrate it in their everyday work practices.

There is certainly a problematic situation regarding user support at the company. There are two different dimensions regarding problematic user support:

- there is an unclear division of user support responsibilities between the Blue Circle Cement IS department at the Head Office, on-site PC coordinators and trainers that are employed on a project-basis
- local support at the works is inadequate

Employees feel that local IS support at the works is inadequate.

"There's not enough expertise on site. [...] the amount of knowledge that we've got on, is really picked up as you go" (Process Control Engineer).

Even the only site that employs a full-time PC coordinator only made him full-time in May 1997. The other works we visited have three part-time network coordinators, and other sites tend to have one part-time coordinator. Although new systems are implemented essentially through visits of IS people from the central IS department, the knowledge and expertise that remains on site is

limited. During the implementation of the WANs, the LANs and Microsoft Exchange three people from the BCC IS department spent a large amount of time at the various sites, but they retreated back to the centre once the project was completed.

Responsibilities for user support are unclear and users are confused about who to contact:

> "they [local PC coordinators] constantly get phone calls about support issues that possibly shouldn't be going to them in the first place. IMS issues should be going straight to the trainers and they're not. [...] and shouldn't be. Any other issues, for example, software issues, they can actually bring to me. But they don't" (member of IS department).

This view was accepted as accurate from the IS department too:

> "[...] what we are doing is rolling out a lot of PC systems. There is a problem in supporting those. I think it's a very open question as to how you can support those centrally" (IS manager).

> "[Y]ou bring the NT trainers in, but then what are you going to do about support. We're not supporting. [...] and the users desperately need to be hand-held at the moment because so much is changing and they don't really know how to take it" (member of IS department).

There is also a lack of alignment of views between the PC coordinators and the IS department. The IS department feel that the IT responsibilities are a very small part of a PC coordinator's job, whereas the PC coordinators themselves view them as taking up a great amount of their time. There are two elements at the moment that are the responsibilities of local coordinators at the units: network and PC support. With the new networks that have only recently been installed and the moves of systems away from the mainframe to the PC environment, they have been picking up a lot more work than they can cope with at times. It appears that with the introduction of the local area networks, the NT servers supporting Exchange and the increasing number of systems that are likely to run on an NT server at each of the business units, there will be a need for increasing IT expertise locally at the works and the difficulties will persist.

6.4 Case analysis based on our structurational model

As noted in Chapter 5, the structurational model that was developed can be employed to analyse and explain the reasons behind most of the problematic aspects that constrain IS support for employees. We propose that the reasons lie in the fact that the interaction between employees and IS continually reproduces the deeper structural properties of the organisation which are largely against empowerment.

We note an example of the reproduction of the company's structures through the interaction of employees with IS that occurred with the introduction of the IMS (although not related to a constraining aspect of IS for empowerment). When the new IMS was introduced the Head Office requested that the Finance departments at the business units produce more reports for them, since the new system facilitated report composition.

> "Apparently that's happened with the IMS system, Finance [at Head Office] ask for more reports than they've ever asked before. And they [business units] are spending time doing those reports which they wouldn't have had to do before" (member of IS department).

Thus the use of the new information system, was influenced by the structures of legitimation and domination of the company that define the powerful role of the Head Office. Through the extensive report writing that was not requested before, these structures were reaffirmed and reproduced as finance staff had to comply to the Head Office's requests.

6.4.1 Reproduction of structural properties

i) IT people build, introduce or support information systems

A clear example of how the design of IS is mediated by the institutionalised features of the organisation is given by the ordering procedure in the IMS. Despite the 'grand words' of managers that proclaimed that they primarily see IS as enabling the delegation of authority, the need for authorisation by a superior persisted and authorisation levels remained unchanged:

> "But I think for a long period of time though as far as the systems are concerned we've been moving in this direction in terms of trying to give more power to the guys who do

the job without having to go up to supervisors or managers or whatever to get permissions to do things" (IS manager).

However, through the interaction between developers and IS, the structures of legitimation and signification that are against employee empowerment, were reproduced and will continue to be reproduced through the order process.

As noted in Section 6.3 users are facing significant inadequacies in the support that they are being provided. The main reason for these seem to lie again in the reproduction of the institutionalised features of the company through the interaction between human agents and IS. Up until the beginning of the 1990s, IS were used by Head Office as a means to maintain control of the various works. IS were not seen as a support technology for individuals, not even for the business units themselves.

"Up until now we have had very much a centralised system in terms of strategic systems that we are operating. [...] sales and marketing, manufacturing, finance and personnel they are our sort of four main systems. [...] All those four main areas have been supported on the central mainframe. [...] for example the financial side is handled centrally, because it financially makes sense to actually only do things in one place, with only a tenth of the resources being required." (IS manager).

These patterns of centralisation reflect the structures of signification and domination that governed the role of IS. These structures though are responsible for the inability to provide user support as their information systems have always been mainframe-based and centralised. As more and more PCs are introduced on the sites, a move from centralised systems towards decentralisation is taking place. That is why the central IS department is finding it extremely difficult to support units and users at the units and is reproducing the structures of domination and legitimation that favour centrally provided support which constrains employees.

"We unfortunately have a manager, who doesn't like us supporting whatsoever. So the issue there is that we shouldn't really be supporting. We should just be doing our job implementing, and then leaving it and the support should be addressed elsewhere, whether that be with PC co-ordinators, whether it be with friendly faces or out of the business units, whether it be with an external company that they phone up, the support should be elsewhere. But it's not, never really been black and white. Been very grey. And I think that is the problem. Support is definitely a major, major issue with the company" (member of IS department).

These issues are very relevant when we consider the IS department's approach to users more generally. It appears that there is pressure on

employees to use the IS that are available in the company. Users were frequently found 'complaining' that the IS department is dictating their needs:

"our IT people - and maybe this is the problem - are trying to drive this; they are trying to get everyone to use email and I think that perhaps the demand needs to come the other way around" (Training Manager).

"I think the IT people have to get the idea that they are not driving the company; they are providing a service to the people that do drive the company" (Training Manager).

This poor relationship between users and the IT department is probably due to a lack of communication between them:

"We need to tell them [employees] what's happening. We go along and say, 'look, on February 2nd, you're now getting Microsoft Office'. We need to go and tell them in October that we're planning to give them Microsoft Office in February and do they have any problems or anything that they want to raise with us. [...] We've got to tell them why we're doing the things we're doing. Why are we spending the money on putting a wide-area network in, why are we doing all of this stuff. They don't know that. They've never known that until it's been jumped up and stood in front of them, or when they're sitting on a training course" (member of IS department).

However the lack of communication and the approach that the IS department has traditionally followed was influenced by the structures of legitimation and domination that constrain empowerment. These delineate the role that employees hold in relation to the other groups in the organisation and are reproduced in the implementation process: employees have no resources to affect implementation of new systems and are always the 'last to know' about the new system. This approach could be partly responsible for the fact that employees often feel 'afraid' of the systems and see them as peripheral to their activities.

"I think some people until they get into it [information system] and use it on a regular basis, they were almost afraid of it" (personnel manager).

One of the fear factors related to initial IS use is that employees feel incapable of operating the systems. Many employees - particularly at lower levels - until they get on board and feel confident in themselves, think that they can actually damage the IS, and they are concerned with the possibility of 'messing something up'. These concerns should have been faced by the IT department and the fact that they still persist suggests that they have not been dealt with adequately.

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ii) employees use information systems

The constraints that the company is experiencing in relation to how employees merely accept the outputs of an information system at face value and fail to question the results is another expression of the same problem that we came across in BICC Cables. The move to automate processes and tasks embedded the knowledge that employees possessed into computers and IS and gradually took away the judgment that employees had to make. Now that employees are called upon to make decisions that managers previously had to make and exercise judgment on work processes that they do not understand, they demonstrate considerable less capability and knowledge.

> "I think there is a second danger that over a period of time, the employee may forget how to do the things that he is depended on the computer to calculate. So it can be that when you come to design a new system that you've lost the knowledge set of knowing how the thing operates in the first place because people just relied on the computer system to do all that for them" (IS manager).

These difficulties are aggravated in the process industry due to a further factor. The fact that employees accept everything the information system tells them at face value and fail to question its output could be due to the fact that employees have relied - for more than a decade now - on an information system (distributed control system) to control their process and show them what is happening. The old times where there was a lot more manual involvement in the production process, have been replaced by highly automated technology which has formed the medium between workers and the production process (e.g. see also the case of the paper mill in Zuboff 1988).

Thus the system has become the only medium for employees to 'get in touch' with the process and has become a means of understanding 'what's going on' around them. These attitudes towards an information system are not limited to process workers that are directly involved with production but have spread in every function of the organisation. This is not surprising as the core computerised control system is the basis of information in the organisation. No one literally 'weighs' the tonnes of cement that are produced or calculates the price for the 30,000 tonnes of mineral sands that are needed annually as

raw material. All the various IS sit on top of the distributed control system and take the necessary data directly from it.

In the company we observed significant concerns and fears towards the use of IS, especially by manufacturing operatives and staff at lower levels. These can be traced back to the initial goal the company had with the introduction of computer-based systems, the reduction in manning through the automation of tasks. Thus the structures of signification involved in the initial introduction of IT in the company informed the interaction between employees and IS and are still in some cases evident.

As the company has automated many operations, the structures of signification related to the introduction of IT are beginning to change. The new agreement which removes compulsory redundancies is likely to fight the initial fear:

> "we've taken away the factor now that computers will do away with jobs. I think that was the original fear factor. We have taken that away so in general there is a reasonable standard of acceptance that they [computers] are of benefit and most people now will in fact get involved" (Personnel Manager).

In their approach to employee access to the main systems on the mainframe and on the packages on the LANs, the organisation is mediated by the structures of domination and legitimation covering different functions and hierarchical levels (as in BICC). For example on the MABLE system:

> "different people have different levels of access, some people only have a enquiry function [e.g.] a guy on the shopfloor. They've got one of these in the stores and he might want to see what's in store. He can't do anything else" (PC coordinator).

Similarly regarding access to the Internet, IS managers are informed by the traditional structures of signification and legitimation that see a divide between the interest of the individual agent and the interest of the company.

> "I mean the representatives have got CompuServe which came with the laptops but they've been told that it's not there for their use. They shouldn't be using it because we don't know why they would want to use it at the moment other than for their interest rather than for the business" (IS manager).

By setting these guidelines though related to a new system use, the IS managers once more reproduce these traditional structures .

Finally the traditional structures of signification and domination that are involved in the possession of information are very evident in the company. People are very reluctant to communicate:

> "There's still, however much you try, there's always something in the back of people's minds saying, well if I tell them that, they're going to be as much in the know as I am. So next time someone asks them, they'll know the answer and they won't come to me and think I know it all" (member of IS department).

6.4.2 Transformation of existing structural properties

Apart from the conditions that suggest the reproduction of existing structures, we also noted some instances where the interaction between human agents and IS transformed rather than reproduced the structural properties of the organisation that constrain empowerment. These are presented below.

The introduction of the new IMS triggered a transformation of those structural properties that constrain empowerment. The system allows an employee to input some information about a maintenance job that he/she just completed so that a database containing information about each job can be built up to inform future planned maintenance. This information should enable a worker when he/she comes across the job the next time to know precisely what resources are needed,

> "[...] without relying on the experienced man to say 'we're going to take this' [...] so it empowers people to be able to directly go into a job and then resource it and say, I need these, these, these, and get on with it without reference to you [the manager]" (Personnel Manager).

> "[A]fter a period of time it will built up a history of that particular job as it occurs over and over again. Once it's built up a history, next time that job needs doing you can look at the last job that was done and use the same information" (PC coordinator).

Hence the interaction between employees and the IMS will gradually (as the database is built up) transform the distribution of resources, as the IMS acts as a source of expertise and knowledge that the employees can draw upon. Initially employees were found to spend far more time entering data than benefiting from the database. This is not surprising, for at each works the employees know the plant intimately and usually possess the necessary experience. They know what they need before they even attend to the job.

Low labour turnover which is a general characteristic of the company also means that employees are quite experienced and knowledgeable about the jobs in the works. Still the IMS can form a depository of expertise that is independent of individuals and which can be more readily shared. The IMS was introduced essentially to enable better control of the spendings on maintenance which are significant since facilities in the works are ageing, yet an unintended consequence was that its use has empowered employees by transforming the distribution of resources (structures of domination) in their favour.

Similarly with the IMS:

> "anybody will actually be able to input information rather than just receive. At the moment some people can only read, with the new system they will actually input information. If they see a job that needs doing they can actually input information to say 'revolver needs changing'. Lower level, shopfloor will have far more input into what happens" (PC coordinator)

The intention behind this change was to improve plant performance and minimise unscheduled breakdowns. Nevertheless the interaction between lower level employees that were not allowed to input information into IS and the new system has an unintended consequence: it transforms the structures of signification that constrain empowerment by defining that lower level employees do not have anything to contribute to the system and should just be receiving data. Now employees can be usefully involved in the everyday operations and they are recognised for their potential contribution.

There is another element that is being designed intentionally into the IMS system to transform the structures of domination and affect the distribution of resources in the company. The IMS will enable the delegation of budgetary responsibility so that budgets can be controlled at a much lower level than is necessary purely for the accounts and for the general ledger. The system will produce figures for costs of maintenance for each distinct cement mill according to each section engineer who is responsible for the mill. The desire to change the structures of signification and domination though preceded the development of the system. The IMS does not empower section engineers unintentionally in this case, but it contributes to the transformation of the

existing structural properties, that determined that control should be maintained at higher hierarchical levels.

On a company-wide level, we find another manifestation of the potential of IS to affect institutionalised features of the organisation. IS gave management the confidence to 'let go':

> "one of the reasons that has held up empowerment in the past is 'how do I know what they're doing; if I don't have a system that makes them get permission from me before they do anything, how do I know what they're doing?' and what IT has done is that it has given us access to that; we know what people are doing. So it gave us the confidence to say 'you don't have to get our permission anymore because due to IT we can find out very quickly what people our doing'. Now eventually you build up the trust of people and you don't bother to use the systems that are there to police them because you trust them, but on day one I am afraid trust is something that has to be earned" (Training Manager).

As one example, the company has established a very comprehensive personnel database which enables Head Office managers to know the exact number of employees on the sites. Before the introduction of this database, it was quite difficult to keep track of numbers:

> "Five years ago by the time we had worked out how many people were working for us, it was a different number!" (Training Manager)

Hence in those days they had a very rigorous system of approving appointments in place with numerous forms that had to be authorised and signed in order to maintain some sort of control. The new database was introduced to improve control of numbers but at the same time, its use demonstrated to the central personnel department that they did not need the approval procedure any longer.

> "Now our local managers can employ whoever they want to. However, we know about it within five minutes, whereas five or six years ago we might never have known unless we'd given him permission" (Training Manager).

Thus the reflexive monitoring of managers at the Head Office saw the unintended consequence of the introduction of the database and instead of reproducing the existing structures of legitimation and domination that mediate the hiring process, transformed them.

Managers have realised the potential of IS to keep track of what employees are doing and seem to have taken advantage of it.

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"So these are the sort of things; I think what IT has done for us is actually given us the confidence to let go. And more and more we find that we don't need it - we trust people; but if you don't have it there it's difficult to build that trust" (Training Manager).

Still as noted in Section 6.4.1 they have not abolished the need for authorisation on the order function on the IMS.

The same ideas were echoed by an IS manager:

"on the sales side there is relatively little restriction but things [orders, sales] are recorded afterwards. So if something untoward has happened you don't prevent things happening what you do is you have a logging mechanism after the event, whereby that can be viewed and if there's a problem then action can be taken. So it's something of a threat there; if you do things wrongly we'll know, albeit very rarely it's actually been used to find out some foul play" (IS manager).

Similarly to back up the devolution of budgetary responsibility the company needs a means of identifying who has done what, if things do go wrong.

"You've got to have a degree of trust of course and when things do go wrong you've got to have a means of finding out how they've gone wrong and the circumstances in which they went wrong so you can get it right in future" (IS manager).

Thus the IMS system can provide audit trails of what has happened, that enables visibility of who did what and to what effect.

This point is closely related to the monitoring and surveillance capability of IS. Often IS are employed to monitor employees' performance, reproducing the organisational structures of domination (George 1996; Sewell and Wilkinson 1992). This can cause major problems in the successful operation of empowerment, but as the example of the personnel database noted above shows, the organisation can choose to use the capability of IS to transform instead of reproduce structural properties.

We observed another instance of transformation of those structures that constrain empowerment in the company. This has more to do though with the processes surrounding the introduction of new systems than with the use of the systems themselves. In the past, IT training was provided to users only when the IS department deemed it necessary. Thus influenced by the structures of domination and legitimation of the company, the IS department retained control of resources in the introduction of new IS. On one occasion

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where users did ask for some training they were met by straightforward refusal from the IS department:

> "because what's happened in the past is they've said they need a word processing course and it's been said, 'well okay, if you want it, book an outside course and pay for it" (member of IS department).

In this way the interaction between users and the IS department reproduced the existing structures of domination and legitimation and thus users never placed any further requests for IT training. However this situation was recognised as ineffective by the new IT professional who was hired and given IT training responsibilities. She realised that imposing training on users is not effective; the request for training has to originate from them.

> "I can turn round and say to them as much as I like, you need more training on IT, but they've got to want to do it, otherwise it's not going to work" (member of IS department).

> "But the one thing that I tried to do when going out to do Exchange was empower them to ask for training. So what I've tried to get them to say is where they feel their skills levels aren't as good as they would want them to be. What I've tried to say to them is, well ask me. Because if I have got the time, I'll do it, and if I haven't, I will sort something out for you" (member of IS department).

Thus although the person responsible for training still maintains the control of the training resources, she legitimised employees to initiate a request for training, thus altering the structures of domination and legitimation in a way more favourable to employees. Her intention was to make training provision more effective, as she believes that users must want the training, otherwise it will not be successful. Unintentionally though her actions transformed the structural properties that assigned employees a very weak position in relation to the IT department. Nevertheless this change is likely to have a broader impact on employees and will probably strengthen the perceptions of their position in the organisation.

6.5 Summary - Conclusions

From the above, it seems that Blue Circle Cement presents a more 'conscious' approach to empowerment, which stemmed essentially from the need to improve work practices and employee relations. Undoubtedly as pressures to reduce manning levels remained strong throughout the eighties

and nineties, there was also a need to improve labour productivity. This has been achieved through a comprehensive range of organisational changes that aim to motivate and mobilise employees while creating a more facilitating and encouraging structure.

Information systems support Blue Circle Cement employees essentially in four ways: they facilitate communication and information distribution, they enable better process and operations control, they simplify time-consuming internal procedures and they support employee decision making. Once more, many difficulties were noted in the way that IS support the main dimensions that empowerment entails for work practices. These can be traced according to our analytical framework to the continual reproduction of the traditional institutionalised features of the organisation that are mostly against empowerment principles.

One significant constraint lies in inadequate user support mechanisms. The IS in the company up until recently have been very centralised: all the main systems are still run on the mainframe and LANs are essentially used for office and communication systems. The centralised systems are mainly responsible for the many difficulties that users are facing with IS support. The IS organisation does not seem to have found an adequate form and structure yet.

Although the interaction of actors and IS largely reproduces the structural properties that in the main constrain empowerment, a few instances were noted where the interaction unintentionally results in transforming aspects of these properties. These instances demonstrate that IS can affect structure and can therefore be said to empower employees. This finding also partially verifies our analytical framework which based on the duality of structure, proclaims the inextricable link of agency and structure.

CHAPTER SEVEN

DISCUSSION - ANALYSIS OF EMPIRICAL RESEARCH

This chapter brings together the findings from all the empirical research work and concludes the analysis based on further elaborations of the ideas developed in the structurational model in Chapter Two. Firstly, the findings of the two case studies are examined in relation to the initial findings of the survey and the series of in-depth interviews. The overview shows that synergy exists between the results of the mixed methods, with no major contradictions among them. Secondly, a more detailed cross-case analysis between the two case studies is carried out in Section 7.2. The analysis of the case studies in Chapters 5 and 6 highlighted that the interaction between human agents and IS during their design and use tends to reproduce and reaffirm the institutionalised features of both organisations which are still mostly against empowerment ideals. However in both cases we observed situations of system use and design which transformed rather than reproduced structural properties of each organisation. A second level analysis focused on the reproduction and transformation of structural properties, acknowledges the

role of intention in both and highlights the limitations of structuration theory in explaining change. Using further elaborations of the theory in the social sciences, an improved understanding of the mechanisms involved in organisational transformation and reproduction through system design and use is achieved. The analysis holds some interesting implications for IS theory and practice which are discussed in the final part of the chapter.

7.1 A brief overview of the empirical findings

The empirical research presented in the preceding Chapters Four, Five and Six provided valuable insights into the support that IS provide to employees in manufacturing organisations that are promoting empowerment. The results of the three different methods used are largely complementary. Regarding empowerment, a synergy exists between the results from each method (Gallivan 1997) referring to the reasons for its encouragement, the changes in employee tasks and responsibilities, its effects on the organisation as a whole and so on. This is definitely not surprising since the interpretive research process was an iterative refinement of ideas as ever richer insights emerged and were fed back to previous understandings (see Chapter 3). For example, the interview findings seem to suggest that time is an important dimension for the success of empowerment (see Chapter 8); this could be initially perceived as contradicting the survey result which suggests that empowerment does not come about with time. Upon closer examination of the interview details the contradiction is resolved though. The survey indicates that a change initiative that is not designed to enhance empowerment will not culminate in empowerment over time, while the interview findings refer to the fact that a change designed for empowerment will require a long period of time to show positive performance results. Undoubtedly some inconsistencies were noted regarding peripheral issues, such as the fact that in our case studies the adoption of BPR and TQM is not strongly associated with empowerment, whereas both the interview and survey results seem to support such an association. These though are expected since our goal is not statistical generalisation and the interview sites as well as the case studies were not selected to be representative of the survey population (see Chapter 3).

Regarding the relationship between IS and empowerment, the comments of respondents to the survey confirmed our initial approach which was to disregard IS as being capable of empowering employees and rather to view IS as tools that could be able - providing the general organisational conditions permitted it - to support and facilitate employees in their new roles and responsibilities. The support functions of IS are multi-faceted and wide-ranging. In very broad terms IS were found to support employee decision making, to provide access to general but also more task-specific information, to facilitate communication between individuals and teams and to facilitate and automate tasks. More detailed forms of support were elicited and discussed both in the eighteen companies that participated in the interviews but also in the two case studies. Both sets of data though, also revealed the numerous constraining aspects that inhibit employees from making the most of existing IS in British manufacturing companies. These were analysed in detail and relate to technological as well as organisational and social factors.

Survey	Interviews	BICC Cables	Blue Circle Cement
Information, data for decision making	Support for decision making	Provision of info for decision making Automation of decisions	Provision of info for decision making
Access/provision/distri-bution of information (appropriate, timely, etc.) Benefits for individual (knowledge, understanding, insight, skills development, task ownership)	Access to general info (performance reporting, feedback, building interest)	Info provision (better business understanding, warnings, stimulates interest and questions, advice, feedback)	Simplification of internal procedures
Data for operational activities (speed of response, material control, etc.)	Task automation & facilitation	Task automation saves time, IS support quality check, short-term scheduling,	Better process and operations control
Communication	Communication	Communication/ coordination among team members	Info distribution and communication

Table 7.1: Major support functions as they emerge from each data set

As we see from Table 7.1 and the previous chapters the support that IS provide to employees in organisations that are promoting empowerment seems to revolve around four main functions with different emphases depending on the specific organisational processes and objectives. Similarly, the major constraints that appear in the way IS support employees seem to be

widely relevant to most cases (see Table 7.2). These naturally are stronger in one case or another depending on the specific technological and organisational conditions. For example, the existence of many discrete IS that each support a specific activity constrains employee decision making, rectification of mistakes and promotes a 'compartmentalised' view of the organisation. This is the situation in both case studies, but in BICC as the development of systems was very decentralised there is a great variety of systems and strong divisions between them. Each functional department developed bespoke solutions for the problems they were concerned with and tended to closely guard their own system. In contrast, in Blue Circle Cement all the major IS were decided and implemented centrally at the Head Office and are run through the mainframe which limits the extent of the problem.

Survey	Interviews	BICC Cables	Blue Circle Cement
Inadequate access	Access restrictions	Access restrictions	Access restrictions
Info inadequacies (timeliness, availability, data)	Info inadequacies (untimeliness, difficult to locate relevant info, bad presentation)	Info inadequacies (availability, direction of info flow)	Info inadequacies (bad presentation & difficult manipulation)
System standardisation /integration	Systems structure (separate IS for each activity)	Systems structure (separate IS for each activity)	Passing data from mainframe to LAN
-	Too much prescription by the system	Use of IS limits employee latitude, discretion	Task automation made employees lose understanding of task
Make IS more user-friendly and flexible	Technical difficulties (mainframes, extraction of data)	Technical difficulties (extraction of info from databases)	Extraction of info, report tools
More and better training	Inadequate user skills	Inadequate user skills	-
Locus of control of development, further requirements analysis needed	IT department (user involvement, approach to users)	Rules & procedures prohibit the use of IS to speed up processes	User support, IT department
'Fit' between various aspects of IS development, management practices and business priorities	Users' attitudes towards IT/IS (resistance, too many changes, fear of job loss)	Managers' attitudes towards employees using IS	Users' attitudes towards IS

Table 7.2: Main constraints in the support of IS for empowerment as they emerge from each data set

Our findings suggest that IS support for employees is not straightforward but rather fraught with difficulties. These seem to be due to both technological and organisational factors; this is not unexpected and the boundaries between them are blurred (Walton 1989). However the way the situation appears at the moment, it does seem that employees' responsibilities and

subsequently their requirements are changing and that the IS themselves and IS-related practices fail to follow, and many problems emerge. Both the series of interviews and the case study findings confirm our initial expectations of IS hampering the new work practices (see Section 2.1):

> "we had this situation where we had major investment in systems that was delivering rigid processes, but we had this change in the culture that was trying to become less regimented and less rigid. And the reality was, in some areas the systems inhibited that" (IS manager, Leyland Trucks).

Despite the considerable difficulties in the effective use of IS by employees at the lower levels of manufacturing organisations, it does not appear that empowerment adoption has entailed significant changes to the existing IS, in the form of any fundamental, coordinated changes to IS practices. Empowerment does not yet have a clear impact on IS practices.

As discussed in the case studies, these constraints seem to be the result of the reproduction of the traditional institutionalised features of organisations that are still, in the main, against empowerment. So is there no way to break the vicious circle? Most interactions between IS and human agents in both cases tend to reproduce and reaffirm these institutionalised features. Nevertheless the research also revealed instances where the interaction between agents and IS seems to have led to their transformation, affecting aspects of the rules and the distribution of resources in a way favourable to employees. In contrast to the technological imperative perspective, the technology triggered but not caused some predetermined changes (Orlikowski 1996a). Such instances have been identified in the previous chapters and are analysed in the following section, in order to understand how and why in some cases the interaction between actors and IS does not reproduce but rather transforms structural properties.

7.2 Understanding reproduction and transformation

The findings from both case studies suggest that the major difficulties in IS support for empowerment lie in the reproduction of existing structural properties that constrain empowerment. A structural constraint is created by

the 'objective' existence of structural properties which the individual actor is not able to change. It can be described:

> "as placing limits upon the range of options open to an actor, or plurality of actors, in a given circumstance or type of circumstance (Giddens 1984, p.177).

All structural properties have a similar 'given' character in the eyes of the individual agent. The extent to which this character is constraining depends on the particular context and nature of any human interaction. Giddens notes that indeed some social forces appear to place such limits to the range of options available, so that agents cannot do anything about them. The inability to resist them though, is according to Giddens due to the given motives and goals which underlie their action and which push them to conform. Thus the notion of constraint is variable and related to the material and institutional circumstances of activity, but also to the knowledgeability and understanding that agents possess about these circumstances. Therefore the 'inevitability' of the structural properties constraining empowerment in organisations largely depends on the motives, reasons, knowledgeability and understanding that agents have for what they do and for the social system in which they operate.

Hence, the reproduction of properties constraining empowerment is not inevitable: it occurs because agents wish to reproduce the structure of their organisation, in line with the emphasis that structuration theory places on human agency and its knowledgeability (Giddens 1984, ch.6). Agents' actions are guided by their reasons for acting which normally explain why they followed one course of action rather than another, however small the choice (New 1994). Although Giddens accepts the prime importance of agents' motivation in acting the way they do, he does not include it in his conceptualisation of reproduction. Our view is supported by New (1994) who notes that Giddens emphasises social reproduction as an unintended consequence of action. Nevertheless he admits that:

> "[...] undeniably it is true that one of the main features of the modern age is the pervasive influence of attempts to "consciously" instigate and control social transformation. No conceptual difficulty is presented in analyzing these in terms of the notions of structuration theory, but to do so certainly involves other considerations than purely those having to do with the concepts of action and structure as such" (Giddens 1985, p.171).

Giddens has not incorporated such considerations in the duality of structure which reconciles the image of reproduction and transformation, yet:

> "provides no analytical grip on *which* is likely to prevail under what conditions or circumstances.[...] it does not allow for *some* behaviour engendering replication whilst *other* action initiates transformation" (Archer 1982, p.459-60).

Unfortunately this is as far as structuration theory goes on this point and Giddens has been strongly criticised on the lack of explanation of transformation (Archer 1982). Archer (1982) rightly notes that Giddens fails to answer 'when' questions:

> " - when can actors be transformative (which involves specification of degrees of freedom) and when are they trapped into replication (which involves specification of the stringency of constraints)? These answers in turn require analysis of the potential for change, which is rooted in systemic stability/instability, and the conditions under which actors do/do not capitalize on it" (Archer 1982, p.461).

Therefore in order to extend our analysis into how and why reproduction or transformation occurs, we draw on some further elaborations of the main tenets of structuration theory, namely the work of Archer (1982, 1990, 1996a, 1996b) and Whittington (1992) (see Chapter 2).

7.2.1 Reproduction of structural properties

As conceptualised in Chapter 2 based on the duality of structure, structural properties are reproduced in and through the activities of agents. Nevertheless this statement cannot specify whether this is because all agents wish to reproduce them, or because they resist collective pressures to change, or they remain because they represent the vested interests of the most powerful (Archer 1982). Since we can reasonably assume that in contemporary organisations not all agents will want to reproduce or transform the same structures at the same time, the issue of who is involved in each transformation and reproduction and why, merits further exploration.

Archer (1982) maintains that it is important to identify when a structural property will be transformed, who will be responsible for it and how the transformation will be accomplished. In order to account for these she identifies four elements that need to be analysed: actors' knowledge about the

property, attitudes toward it, vested interests in retaining it and objective capacities for changing it. It is interesting to see how these are implicated in our case studies. Their particular interplay in each instance is likely to account for why some properties that constrain empowerment are reproduced through the interaction of agents with IS, while some others are transformed.

In BICC Cables we noted that IS professionals tended to reproduce the existing structures in their interaction with IS (either in design, development or introduction of new systems). These reproductions were sometimes a result of their own motivation due to vested interests in sustaining particular properties. For example, the autonomy of functions is reproduced through the development of separate systems for each function, since both IS people and employees working within a certain function are likely to wish to maintain such a property (in order to preserve their area of expertise, to avoid any 'outside' interference, etc.). The users in the functional departments are also likely to wish to sustain the independence and 'ownership' of their separate systems. The synergy observed in this instance though is not always present: sometimes IS people are likely to be coerced into reproducing a particular structure by the line managers who, for example, need information from the lower hierarchical levels as a means of control. IS people are likely not to have particular personal interests in doing one thing or the other, but are 'trapped' in sustaining the vested interests of the line managers.

Another example presents the possibility of existing structure constraining their efforts to transform it, and placing limits upon the range of options open to them in a given circumstance. The structure of signification and domination that determines the division of labour among employees and allocates a narrow set of tasks to each, is still being reproduced through the limited screen menus available to employees. IS people replicate this not because they have vested interests in it, or because line managers request it of them, but rather because they feel that it just does not make any sense to give employees more fields of information since they will not use them. In this case IS people do not have the objective capacities to affect the particular structure that defines the narrow division of tasks and hence are constrained into

reproducing it. The constraining dimension of existing structure becomes more evident in the automation of work that has been achieved through the use of IS. Now that both IS people and line managers wish to transform the interaction between employees and IS, they are constrained by employees' lack of skills which was brought about as an unintended consequence of this earlier interaction.

Similarly, in the case of Blue Circle Cement, IS people reproduce existing structures either because they wish to sustain a particular pattern of interaction (between themselves and the users), or because line management demands it (e.g. in the continued need for authorisation of orders). Therefore regarding reproduction of structures in and through IS design, development and introduction practices, we can highlight the following (see Table 7.3): IS people reproduce the existing structures either because they have vested interests in sustaining them, or because line management want them reproduced and they have no real personal interests in opposing them. Yet in some cases, although IS people might want to transform a property, they are constrained by existing structure and do not have the capacity for change. Hence we cannot always assume that the structures that are reproduced are the ones that actors wish to keep replicating, since they might have little choice to do otherwise.

IS people have vested interests in reproduction	Line management have vested interests in reproduction
IS department controls the interaction with users in Blue Circle Access procedure in BICC & Blue Circle View of a limited part of process in BICC	IS people are coerced in reproducing the collection of info from lower levels in BICC IS people are coerced in reproducing the need for authorisation in the order process in Blue Circle Access procedure in BICC & Blue Circle View of a limited part of process in BICC
Synergy in groups' vested interests	**Lack of objective capacity for change**
Development of separate systems for each function in BICC (supported by IS people, managers & staff) Persistence of strict barriers between jobs in BICC	IS people and narrow division of tasks in BICC Both IS people & line managers are constrained by the consequences of the automation of work (BICC & Blue Circle)

Table 7.3: Analysis of reproduction of structural properties in and through IS design & development and use

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In the reproduction of structures in and through the use of IS in both cases, we note again the various dimensions behind reproduction (see Table 7.3). There can be a case where structural properties are 'psychologically supported' by the organisational population if they have been in place for a long time (Archer 1982): e.g. the persistence of strict barriers between individuals' jobs. All members are likely to wish to sustain the structures of signification that define their job as their own private 'turf' and discourage interference from others. Such consensus is the exception though; in the access procedure in both cases, employees have no choice but to reproduce the structures involved as it represents the vested interests of the more powerful - the line or department manager. Similarly in BICC line managers want to reproduce the limited part of the process that a user can view, in order to legitimise their interference (see Section 5.4.1). IS people are also likely to wish to sustain the particular structures of domination in both the above examples for their own interests: maintaining control of the system, for fear of user wrongdoings, etc.

In Blue Circle we observe another example of how an institutionalised property is reproduced even though most groups of actors wish to transform it (similar to the example from BICC noted on the previous page). The replacement of workers with computers and the automation of tasks that has been taking place for many years now, has had unintended consequences (the loss of employee capability and their excessive dependence on computers). These are difficult to affect and place limits on the range of options open to organisational actors given that they behave rationally - meaning effectively aligning motives with the end-result of their conduct (Giddens 1984, ch.4).

It seems that although in a few cases structural properties are reproduced because they express a common desire of all the organisation, the reproduction of existing structures through the use of IS occurs mostly because managers who form the powerful group in the organisation want to sustain them. In some cases where they might be willing to support a change, unintended consequences of previous actions form conditions that limit their

options and constrain their freedom to act. Employees on the other hand seem 'trapped' into replication in both cases and unable to initiate change in a structural property through IS use, if the more powerful groups of actors such as managers or IS professionals have interests in replicating it.

7.2.2 Recognising an equal role for intention in reproduction and transformation

A conceptualisation of continual reproductions of structural properties that constrain empowerment portrays agents as powerless in front of a reified structure. Agents though can also transform structure through their actions and thus "make a difference" to the existing state of affairs. Structuration theory, focused as it is on the interlinked definition of agency and structure, cannot provide a sufficient account of the mechanisms behind social stability or change (Archer 1982). The difficulty lies in the fact that it proclaims all action as transformative and yet only points to unintended consequences interlacing with reflexive monitoring as critical for change (Giddens 1989). Giddens accepts that there are many factors that can influence processes of social change but fails to identify any, apart from unintended consequences of action.

So what about intentional transformations? If we only accept intentional reproductions of structural properties then agents are left with no powers to bring about a change, something which contradicts their transformative capacity and does not adequately represent real-life transformations. Organisations can indeed be intentionally mobilised in some specific direction - this is the underlying premise for the possibility of strategy (Whittington 1992). Planned change is a feature very common in management (De Cock and Hipkin 1997). Intentional reproductions and transformations coexist in social relations, in line with the duality of structure. The issue of intention and motivation though deserves a further analysis, particularly since in organisations we no longer have one actor and his motivation and knowledgeability, but multiple groups of actors with often conflicting motivations and multiple consequences.

Hence our cases necessitate the examination of the intentions behind the introduction of a particular information system (Knights and Murray 1994; Serafeimidis 1997; Symons 1990) and the unintended consequences stemming from its introduction and use. This is quite a difficult task since an information system is likely to be introduced to serve numerous purposes, to affect many groups of actors and thus have multiple consequences (intended or not), be endowed with many different meanings and interpretations and ultimately hold different values and utilities for different actors. These aspects are further exacerbated by the issues of the bounds of agents' knowledgeability, hidden motivations and post-rationalisation. For example, how can one elicit the actual motivations of the main actors involved in the introduction of a system after the event, since they might post-rationalise their actions and/or give false accounts of their knowledgeability? In the case of a positive outcome they might believe that they knew it was coming all along, and in the opposite case, a limitation of their knowledge can be blamed.

To elucidate our point we can examine as an example the use of the Lotus Notes discussion databases in BICC Cables. As noted in Chapter 5, the databases were introduced to enhance communication across the firm; nevertheless users could have decided to replicate the existing structures of domination through their use. So accountants could have used the facility to talk more easily to accountants, senior managers to senior managers and directors could have responded only to directors' comments. Instead they transformed the structures by interacting through the system with employees in different hierarchical levels. Now was this transformation of structure deliberate on the part of the users? Did they intend their actions to have such an effect? Or was the consequence beyond the bounds of their knowledgeability? It is unlikely that social actors that have been engaging in social relations for many years (such as the managers that cut through the hierarchy with their comments) did not intend or at least anticipate such an effect. The reasons behind their actions could have been numerous and diverse (and are extremely hard to trace), but it seems unlikely that at least some of them, did not know what the consequences of their actions would be.

Nevertheless, as difficult and inadequate as it may be, a more sophisticated account of intentionality and knowledgeability of the agents involved in the two case studies is likely to provide a better understanding of the transformations of structure that occurred through the interaction with IS. As our case studies stand in Chapters 5 and 6, they reveal an inherent contradiction: although the reproductions of structure are either a result of conscious, intentional efforts or at least reflexively understood and monitored, the transformations appear to come as an unintended event, 'surprising' the agents involved in the actions that brought them about.

7.2.3 Explaining transformation of structural properties

In some instances of interaction between agents and IS, circumstances are fairly clear; the transformations of structural properties that constrain empowerment were a result of the conscious intentions of some agents, that acknowledged their motivation. They were able to mobilise objective capacities to achieve the transformation and effectively 'convince' or overpower other groups that might have had vested interests in reproduction. For example, in the case of the performance improvements projects Notes database in BICC, the wide dissemination of information to all employees and not just to their managers was intended. Any organisational members that might have had objections to this transformation are likely to have been overpowered since this initiative was strongly supported by the Head Office. The replacement of the spreadsheet containing the performance indicators related to the Manufacturing and Business Excellence programme in the same company was again intended to provide a new interpretative scheme more in line with employees needs.

Similarly in BICC the process of collecting monthly figures from the units to the Head Office in the UK, was delegated directly to the teams responsible for the performance indicators. The introduction of the new Notes system was consciously intended to transform the structures of domination and signification that defined the Head Office as totally responsible for performance control. By enabling the teams to input performance control data

and to view each other's results, the responsibility for performance control and improvement was delegated to the units, hence supporting empowerment. Thus the structure of control was transformed into one of communication and sharing. With the desire to pan-Europeanise the organisation, there is a strong recognition for the need to weaken the role of the Head Office in the UK. Thus the Head Office accepted the transformation (they have access to the data now anyway too) and the units supported it. The only main other group that might have vested interests to replicate are the accountants. They however, are likely not to have wanted the job in the first place, since it was essentially delegated to them because of the accounting software system that was the only one available.

We can see similar intentional transformations of structural properties that constrain empowerment in Blue Circle too. The facility of building up plant history in the IMS although primarily intended to improve the maintenance process, was perceived as promoting empowerment even from employees that had not been involved in the design of the facility. Hence it is reasonable to include the independence of an operative from his superior (at least regarding maintenance tasks) as one of the objectives of the system. Similarly as noted in Chapter 6, the devolution of monetary responsibility is intentionally built into the IMS, transforming the relevant structures of domination.

Therefore intentional transformations of the structural properties that constrain empowerment occur in both cases and form an important feature of interactions between agents and IS. In most cases either no major group of actors has substantial vested interests in reproduction, or such interests are overpowered by those of more powerful groups in the organisation.

Not all instances that led to transformations are so clear-cut though. In the case of the 'Blue Book' in BICC Cables, for example, the intention behind the introduction of the Notes database containing the proposed R&D projects was to promote coordination between the R&D centres across Europe, reduce duplication of effort and ultimately make the R&D process more cost-effective. Thus the objectives were to affect the structural properties involved in

research and development practices across the organisation. These encouraged unit autonomy and independence and discouraged sharing and coordination.

These properties were indeed affected by the intentional interference, but the consequences of this transformation were not limited to them. In order to achieve the intended benefits, R&D employees in each unit were given direct access to all the R&D projects in the company, something which only their director had access to previously. This 'internal' change in the social relations between Technology Director and his/her R&D staff seems to be an unintended consequence of the intentional changes to the relations between units. R&D employees were not given access to the database to affect the distribution of resources between themselves and their director, but rather to coordinate projects better and know who is doing what in the company. But how can a change at the level of broader social relations 'travel' to a more restricted interaction? According to structuration theory, the activities of agents within a restricted context of interaction contribute to the reproduction of the larger social system that the interaction is a part of. Hence changes in the larger social system will serve as the medium for activities in more restricted interactions.

To use a metaphor of language use that Giddens often employs: through an act of speech, one contributes to the reproduction of the language; if the rules governing the language are somehow affected and changed, so will acts of speech. The mechanism of 'travel' from one level to the other though are not the properties themselves, but the agents that are involved in both levels. For example, an R&D employee engages simultaneously in multiple social systems within the organisation (Whittington 1992). As noted in Chapter 2, social systems are the reproduced relations between actors which are organised as regular social practices (Giddens 1984). Thus one system is the R&D department in his/her particular business unit, the business unit itself, the relations with another R&D department in another unit and so on. These overlap and are really inseparable. The conduct of individual actors reproduces the structural properties of larger social relations, and a change

targeted at the structures of these larger social relations is reflexively monitored by the actors and serves as a medium for their conduct. The intentional change in the wider social system formed by the relations between all R&D units in the company resulted in a transformation of structural properties which will act as medium for relations within a more restricted system (R&D department within a unit).

The other examples of transformations that seem to have occurred unintentionally all follow the same pattern. The use of the Notes discussion databases in BICC Cables as a means to reach people within the organisation that could be a source of advice (see Section 5.4.2) was intentional in the sense that it came to support a transformation in the existing social practices that had been affected by downsizing and delayering. There was also a conscious desire to enhance communication between the various units. Therefore the change on the level of the broader social system (the entire organisation) and the transformed structural properties governing relations at that level act as medium for activities in a more restricted context of interaction: that formed by the relations between the employee and his superior. Through reflexive monitoring the employee sees that the use of the system enables him to be more independent and its use is likely to take place even in cases when the superior could have been able to provide advice. This can affect the structures of domination guiding the specific interaction, hence 'empowering' the employee.

Therefore an intentional transformation of a structural property of a wider social system achieved through the interaction between agents and IS, acts as a medium for activities in more restricted contexts of interaction and can thus support empowerment.

Interestingly, examples of unintended transformations from Blue Circle Cement reveal a different pattern: transformations of structures governing restricted contexts of interaction serve as the medium for transformed relations in a broader system. For example, as the new IMS enables operatives to input information about maintenance tasks that need to be

carried out, the change in the activities within a restricted interaction contribute to a change in the reproduction of structures of larger contexts of interaction. The interaction between employee and IS affects the structures of signification and legitimation and contributes to their transformation beyond the restricted context of a maintenance job. As noted in Section 6.4.2, shopfloor employees are now recognised as able to contribute not just to better maintenance management but to the overall control of operations. These affected structures are likely to act as the medium for interactions within the broader social system of the organisation and can thus lead to empowerment.

In the same way, the introduction and use of a personnel database in Blue Circle affected and transformed the structures of signification and domination that had been involved in the hiring procedure in the past (see Section 6.4.2). Through the reflexive monitoring of the agents involved, the interaction between agents and IS in a restricted context (hiring procedure) contributed to the transformation of structures of larger social practices throughout the organisation which favoured centralisation of decision making, thus leading to decentralisation and site management empowerment.

This analysis of the cases helps to explain how the interaction between agents and IS seems to unintentionally affect structural properties that constrain empowerment. Nevertheless we can only capture the initiation of the transformation process, the original 'spark' that triggered it and the mechanism by which it can travel to broader or smaller contexts of interaction; although the transformed structure can serve as a different medium for action, the consequences of this further action can always be unexpected and unpredictable. Empowerment can be unintentionally supported in this way, but that does not mean that it will.

To summarise we note that, as observed in the case studies, some structures constraining empowerment are (see Table 7.4):

- reproduced either intentionally or unintentionally, because agents cannot do otherwise and are 'trapped' into replication or because they might not know that they are reproducing
- affected and transformed intentionally
- affected and transformed as an unintended consequence of action in the way described above

	Intended	Unintended
Reproduction	Some agents have vested interests. Other agents are 'convinced' or overpowered.	Agents constrained by existing structure; cannot do otherwise. Or agents do not realise they are reproducing.
Transformation	Some agents want to transform. Other agents agree or are pressurised.	An intentional transformation of a structural property acts as a different medium for further interaction.

Table 7.4: Analysis of the reproduction circuit as emerging from the case studies

7.2.4 The role of IS in the transformation of social practices

Undoubtedly similar dynamics and mechanisms characterise the constitution of social practices in organisations in general. So is there anything particular that the interaction between agents and IS brings about? We would argue, based on the evidence from our case studies, that IS appear to be involved in an interesting way in both reproduction and transformation for two reasons: firstly, IS seem to have the capability to link wider and smaller contexts of interaction seamlessly, and secondly because the way a particular information system is implemented defines a specific system of relations between organisational actors. The first capability is especially relevant for the unintended transformations of structural properties, as discussed above, while the second is relevant to transformation in general. As an information system operates both on an individual as well as on a group, departmental and organisational level, it can affect broader and smaller contexts of interaction, and it facilitates the passage of changes from one to the other.

The second capability relates to the fact that when a system is in place it defines a system of relations between actors in the organisation, specifying e.g. who inputs data, who reads it, who has access to it, who has not etc. When we say that an information system was introduced or its use modified somehow in order to affect a particular property, how exactly does that happen? Apart from changing the activities of agents on a 'factual' level, just as a tool would, by sometimes defining a different system of relations between agents, it makes people perceive a change in how these relations stand. The use of a particular IS defines a system of relations on the level of action. For example, as noted above, the differential access to information that R&D employees had in relation to their superiors in the BICC case, is one of the ways in which employees define their position in the network of relations that an IS sketches out. By changing some aspect of the information system's use (who participates and in what way, for example), a change can be effected on the system of relations. Agents monitor how the system of relations is defined at the two different phases (before and after the change) and although nothing else in the organisation might have changed, they perceive a change in the social system. Thus any change in the system of social relations has immediate links to the way structural properties are translated on everyday social practices.

One particularly interesting aspect related to the system of relations that an IS defines is who receives or inputs information. When employees obtained direct access to information that was previously only received by their superior apart from the obvious change in the distribution of resources, employees' perceptions of responsibility were enhanced due to the way the structures of legitimation were encoded in IS use: whoever receives or has access to information is seen as able to act on it (see for example Section 5.4.1). Similarly whoever is authorised to input data is determined by a locus of responsibility and a potential for contribution to the rest of the organisation (as in the Blue Circle case with the input of process operatives in the new IMS). On the other hand, read-only access also defines a particular position in the network of relations: the user is a participant in the network but cannot exchange and contribute information into the network on an equal basis with

the other members that can (see the notion of 'information consumer' in Section 5.4.1).

Therefore our findings suggest that the interaction between agents and IS can affect structural properties either intentionally or unintentionally. But how exactly do these interactions affect structural properties that constrain empowerment? We believe it is worthwhile to explore this issue in a bit more depth. The instances that led to the transformation of structural properties involve either a "real", concrete change e.g. in the distribution of resources, and/or a change in employees' perceptions of their role in the organisation.

For example, in the discussion databases in BICC, where IS facilitated communication between people from lower and upper levels of the organisation, although the interaction does affect the institutionalised features of the organisation, it does not give employees any more power in any objective sense. Although they might be exchanging views on a topic one day, the superior can still pass directives around the next. What is really affected by the interaction is the perception that employees have of the distance between hierarchical levels. On the other hand, when in BICC the R&D employees received information through Lotus Notes that was before only made available to their Technology Director, we can see a more concrete change in the distribution of resources, which once more is accompanied by a change in perceptions as employees are likely to feel more responsible about their work.

An analysis of all the instances that led to transformation elicited two major characteristics: firstly that the specific interactions between human agents and IS affected employee perceptions about their relative role and position in the organisation in a positive way, or secondly these interactions affected the uneven distribution of resources in a more 'concrete' way by providing additional resources, in the form of information and knowledge. All instances were characterised by a change in employee perceptions of their relative position as is to be expected because of the continual reflexive monitoring that employees engage in. When the change in perceptions was

accompanied by a more concrete change in the distribution of resources the transformation was particularly potent.

Furthermore these interactions are not enacted in a vacuum; employees are continually engaging in many other interactions both with other IS but also with their colleagues which continually affect their perceptions and understanding of their position in relation to the rest of the organisation. Perceptions are more vulnerable to contradictory and conflicting messages coming from other interactions and therefore, when transformations involved a more concrete change in the distribution of resources, they are likely to be less easily shaken.

The change in perceptions of relative power and position recreates the structural properties gradually starting from the human agents that were involved in the interaction. For example, when both in BICC and in Blue Circle Cement an information system provided the capability to break the absolute dependence of employees on their supervisor for advice, the particular interaction affects the relationship between supervisor and employees but apart from them, it will be observed and reflected upon by numerous other employees.

Hence IS can indeed lead to empowerment, but only through the reflexive mediation of actors. As noted in Chapter 5, employees are continually reflexively monitoring their use of the systems and the results of their interaction with them. It is through their monitoring of this interaction that they begin to understand how the traditional structures of their organisation are slowly changing. As this understanding passes from the level of agency to the level of structure, it can gradually affect and change the structural properties that constrain empowerment.

"So we've got quite a lot of systems that spread information around, we haven't installed them specifically to empower people, but when you install them you find that you have empowered people by installing them. Again I think it's in many ways not the systems; it's the way you use them. I know that in some quarters IT can be seen as restrictive because of the policing aspects which I mentioned earlier, and yes you can police people if you wish. But it's a matter of how you use the information that you get, and if you use the information in a restricting way then it will restrict; if you use the information

in a helpful, supportive, empowering way then people feel helped, supported and empowered by it. So it's not the systems; the systems are dead things, it's the way you use the information they give you" (Training Manager, Blue Circle Cement).

7.2.5 Synthesis: a new understanding of IS and organisational stability and change

Therefore our analysis based on structuration theory provides the necessary focus on the existing structures of the organisation which are in many cases constraining empowerment, and are thus likely to create difficulties for IS support. The analysis revealed the complexity and embeddedness of the situation. So the 'solution' will not be as simple as installing a few new computers and enhancing access to existing systems. Our analysis suggests that the problems are deeply rooted in the social relations in the organisation, and will depend on the intentions and motivations of groups of actors and their desire to reproduce or transform these structural properties. Nevertheless our findings uncovered two facilitators: IS span both broader and narrower contexts of interaction and can help to produce unintentional transformations in favour of empowerment, and secondly, IS define a system of relations on the level of action and any change in this definition can affect agents' perception of the social system.

The analysis presented in the previous sections affords us an improved perspective on the involvement of IS in the reproduction and transformation of organisations. This perspective does not come to replace but rather to enrich the existing work on IS and social transformations, and in particular the reinforcement politics perspective (George and King 1991; Kling 1991; Orlikowski and Robey 1991). We will analyse the specific contributions that our analysis makes to IS theory in more detail in the following section, but the most important feature is that it accommodates both social reinforcement and transformation and provides some mechanisms to explain when the interaction between agents and IS will contribute to the one or the other. To summarise, the interaction between agents and IS, either during their design, development, introduction or use, reproduces the structural properties of the organisation in which it takes place. This reproduction sometimes takes place

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intentionally because agents consciously wish to maintain continuity (usually due to vested interests of the most powerful). Reproduction can also be unintended when agents are constrained by the existing structure and cannot 'do otherwise', or when they do not realise that they are contributing to reproduction. The notion of intention here refers to all agents in general, as a characteristic of the organisational process and should not be perceived from the point of view of any particular group of agents (e.g. a reproduction can be intended by powerful managers who convince employees to reproduce too, but from the latter's point of view this reproduction is unintended).

The interaction between agents and IS can also transform structural properties again either intentionally or as an unintended consequence of action. In most cases of intentional transformations either no major group of actors has substantial vested interests in reproduction, or such interests are overpowered by those of more powerful groups in the organisation. Unintended transformations seem to take place as unintended consequence of some other intentional interference to affect a structural property. An intentional change in a specific context of interaction is observed by the agents involved and serves as the medium for their conduct in other contexts of interaction, broader or smaller.

IS appear to be involved in both reproduction and transformation. IS seem to have the capability to link wider and smaller contexts of interaction seamlessly, thus facilitating the 'travel' of structural changes from one context of interaction to another. Furthermore the way a particular information system is implemented defines a specific system of relations between organisational actors. Hence any change in this system of social relations has immediate repercussions on the structure that organises this system of relations.

The transformation of structure through the interaction between agents and IS is important in organisations that are encouraging empowerment, since as our findings suggest, in many cases traditional structural properties persist. This could imply that these properties are reproduced intentionally or that agents are 'trapped' into this reproduction by the consequences of previous

interactions. If the properties constraining empowerment are reproduced intentionally, then powerful groups of actors are likely to fight change and hence empowerment will probably be difficult. If the organisation is more or less 'trapped' into replication, then an acknowledgement of the situation is the first step towards addressing it (as e.g. in the technology diminishing employee judgement and skills over time, see IS director, Section 5.4.1).

In any case, in order to identify whether and when a particular structural property will be transformed, an analysis of specific and general conditions is necessary. The particular interplay between actors' knowledge about the property, attitudes toward it, vested interests in retaining it and objective capacities for changing it, is likely to account for its reproduction or transformation. These will also be mediated by broader conditions such as pressures from other groups of actors (e.g. directions coming from a Head Office as in BICC's case), the general instability of relations and practices (as during the introduction of a change initiative), opportunities to capitalise on change (e.g. during a merger), and the dialectic of control (demands from employees or their unions, etc.)

The objective capacities and options of organisational members are not all the same however: employees are likely to have less objective capacities for changing structure compared to more senior managers. Hence intentional transformations of structural properties constraining empowerment are likely to need to be supported by managers in order to be successful. This issue is particularly pertinent to IS practice and is analysed in the final section of this chapter.

7.3 Implications for IS theory

The analysis presented in Section 7.2 is original and has some interesting implications for the IS field. These firstly involve the way structuration theory has been - and can be – applied to IS research, and secondly, the insights derived from the analysis relate to current understanding about IS, specifically

the impact of IS on organisational structure, and the role of IS in organisational change.

7.3.1 Application of structuration theory to information systems

It is evident from the above that structuration theory can be valuable in analysing interaction between agents and IS, particularly in research designs that need to focus on elements of organisational structure. Nevertheless our application of structuration theory as an explanatory framework revealed some serious limitations of its theoretical positions which have not been previously identified in the IS field. For example, in the study of change, although the theory spans both the images of reproduction and metamorphosis, it provides no indication of **which** is likely to prevail, **when**. Giddens was primarily concerned with drawing up an ontology of human society, and consciously avoided a descent into specificity. Nevertheless in the study of contemporary organisations with the current emphasis on organisational change, it is important to be able to specify when and how transformation happens.

A second limitation that is of interest to IS theory is Giddens' focus on reproduction and transformation as unintended consequences of action. This is a point which has not been made in the existing critique on structuration theory. Despite Giddens' emphasis on agents' motivation and transformative capacity, reproduction and transformation are primarily seen as unintended consequences of action. Both Orlikowski (1992a) and Walsham (1993a) have overlooked Giddens' focus on unintended consequences of action and talk of transformation only in cases where agents intentionally pursue a change in the existing properties. Our preliminary analysis based on Giddens' guidelines, revealed a paradox: agents knowledgeably and often intentionally reproduced existing structures in their interaction with IS, while transformation according to the theory, 'caught them by surprise' when they monitored an unintended consequence of action. As this cannot be since we are referring to the same agents, the notion of intention was incorporated in our analysis of transformation.

Despite his focus on transformation as unintended consequences of action, Giddens fails to specify the mechanisms that make action result in unintentional transformation. A major contribution of our analysis to structuration theory is the identification and explanation of the linkage between action and unintended transformation of structure. The link between action and structure is more obvious in instances of reproduction and of intentional transformation; in unintended transformation of structure the link is not straightforward. The analysis of unintended transformation presented in Section 7.2.3 is an additional insight and extension to structuration theory.

A final point that is important for the application of structuration theory in IS, is the existence of multiple groups of agents with often conflicting interests in reproducing or transforming structural properties. In organisations and wider social systems, there is not a complete integrity of structural properties, what Archer calls "a rigid coherence of structural properties" (Archer 1982, p.460). Some properties are more easy to change and some are more enduring. Archer (1982, 1995) finds that this specification of the strength of constraints is against the principles of structuration theory, yet this is not so if we consider the existence of different groups of agents. If a property is perceived as resilient to change this is so because a powerful group of agents wishes to keep instantiating it and thus reproducing it. Therefore, in organisation studies one will probably need to break down both the holistic systems of agency and structure that structuration theory envisages, in order to achieve anything more than tautologies.

These shortcomings of structuration theory have not been previously identified by the researchers who applied it in IS (Orlikowski and Robey 1991; Orlikowski 1992a; Walsham 1993a). Instead the theory has been rather 'religiously' applied with no questioning or mention of the limitations of its theoretical positions. For example, none of the researchers who have applied structuration theory in IS have noted the inadequacy of structuration theory in describing transformation. Some of these limitations have indeed not been emphasised in the social sciences literature either, although our claim for originality is cautious since an exhaustive review of applications of

structuration theory in other disciplines has not been carried out. The theory provides a solid basis for understanding social practices and the relationship between structure and action, but is likely to need elaborations such as the ones proposed in this chapter, in order to deal with specifics.

Nevertheless, our analysis based on an application of the theory produced some valuable insights for the role of IS in organisations, which are described below.

7.3.2 The impact of IS on organisational structure

Referring back to Chapter 1, one of our starting points was that IS should not be seen as being able to empower employees by their introduction and use. Since empowerment was defined as decentralisation of decision making, which is an element of organisational structure, we argued that IS should not be seen as able to bring about structural changes on their own. At that stage we were criticising researchers who envisioned situations where managers did not want to empower employees while IS did empower them, and wanted to clarify that we did not believe that such technologically deterministic views are representative of reality. Yet if IS are perceived as products of action or implicated in action as in our model, according to structuration they can indeed affect structure, by reproducing it or transforming it. That is precisely how structure is constituted and reconstituted: through intentional or unintentional action.

Therefore based on our analysis, we can conclude that the interaction between employees and IS can impact the structure of an organisation and transform those structural properties that constrain empowerment. Our initial expectations were proven inadequate. Our findings suggest that IS can be said to empower employees when they transform elements of the rules of the organisation (legitimation, signification) or change the distribution of resources (domination) in a way favourable to employees. Either with their facilitating capabilities they can enable a change in the uneven distribution of knowledge and information between managers and lower-level employees or with their

ascribed meanings they can affect the perceptions that employees have about their relative position in the organisation. All these transformations are subtle and emergent and some can remain at the level of perception without materialising into something more concrete. Even so, they are likely to exhibit themselves on the level of action and through that recreate structure.

Naturally other IS researchers have noted this before us:

> "Computer systems can restructure social relationships by altering the kinds of information readily available, reorganizing patterns of access to information, altering the cost and work of organizing information, and shifting patterns of social dependencies for key resources, such as computing and skilled computing staff" (Kling 1991, p.344).

Nevertheless, our initial concern was related to circumstances surrounding empowerment where managers might wish to avoid decentralisation whereas IS at the same time enabled it. Our ideas were basically informed by the reinforcement politics perspective as it was expressed by George and King (1991) and Kling (1991) where IS are used by those in power to reinforce the existing structure which is assumed to be in their favour. Therefore, according to that perspective, if management does not want empowerment, then IS will not be able to support it, but they will rather reinforce the existing structure.

Although the reinforcement politics perspective takes into account the primacy of managerial intent and action which was missing in the previous 'causal' relationship views, it has one major limitation: it cannot account for change. Since managers who are the ones in power will employ IS to reinforce the existing decision authority structure which is in their favour - only mediated by external or other constraints - organisations would be characterised by continual stability where structures are constantly reproduced. As this is clearly not the case, the perspective needs to be enriched with further dimensions.

George and King (1991) discuss management as one unified group of powerful actors that can exercise considerable influence on the choices made about IS. As existing literature and our research suggests, there exist many subgroups within management with differential power and conflicting interests.

For example in our cases the Head Office was often found to come into disagreement with site and line management, and even within sites managers in different departments frequently compete to maintain their interests.

The second problem with George and King's argument is that they do not take into account any other organisational members apart from 'management'. This is a rather simplistic conceptualisation though, as management does not surely have absolute power and as our cases showed even very powerful groups such as the Head Office in BICC Cables intentionally relinquished some of its controlling power in order to facilitate the 'pan-European' strategy. Therefore the choices made about structure are not straightforward and are the result of the interplay among numerous subgroups of organisational actors with differing interests and motivations. Furthermore George and King (1991) note the mediating impact of environmental features and organisational history as constraining what management can do. These are related to the structural constraints in our analysis which limit managers' objective capacities to act as they like.

However apart from the above social factors, there is an important caveat in George and King's (1991) perspective: that IS will always have the impact on structure that managers want them to have. The only way in which the technology mediates the 'managerial action imperative' is through existing technological infrastructure and the lack of resources:

> "But managers often do not exercise such sweeping control. The inertia of existing technological infrastructure and the powerful traditions of existing political/administrative systems often constrain the actions managers can take and control what they achieve" (George and King 1991, p.69).

Therefore the assumption is that if managers can choose what technology they would like, it would have the desired consequences on structure. Our own analysis suggests that such is not always the case and that the interaction between agents and IS can have numerous unintended consequences. Although their assumption might sound problematic now, it might not seem so, if one takes into account the particular technologies George and King are referring to. They review research conducted in the

1970s and 1980s which examined computerisation involving data and information processing technologies, hence essentially "administrative automation" (George and King 1991, p.64). The consequences from the implementation of such IT are likely to have been largely expected and controllable, and it is only really with the advent of more advanced IS that the notions of unintended and unanticipated consequences have become particularly relevant (see e.g. Orlikowski 1996a; Yates and Van Maanen 1996).

The perspective presented in Orlikowski and Robey (1991) and Orlikowski (1992a) although essentially in agreement with reinforcement politics, extended the argument to address precisely the above noted limitations. It brings into the discussion the notion of many groups of actors with contradicting interests (in Orlikowski (1992a) essentially two – managers and consultants), and that although managers might want to reproduce particular structures, consultants can react against that and instead act for transformation.

We argue that the perspective developed in Section 7.2 contributes important insights to the existing perspectives on the impact of IS, such as the reinforcement politics perspective (including George and King's (1991) improved interpretation and Kling's (1991) perspective on computerisation and social transformation), the emergent perspective (Markus and Robey 1988) and Orlikowski's (1992a) duality of technology. Our perspective acknowledges that the interaction between actors and IS can lead to either reproduction of existing structure or transformation, thus accounting for change in a way that reinforcement politics cannot. Our perspective links IS impact on structure to agents' motivations and intentions thus avoiding technological determinism. This impact can be intended or unintended by the agents that are involved in this interaction. Hence on the other hand it acknowledges the limits of agent control over the technology's consequences and affords IS a unique potential for transformation that is not usually found in other technologies.

Our perspective though goes further than the existing analyses in two basic ways: it explains how action results in a change of structure which is particularly unclear in unintended transformations (as noted above) and secondly, it actually delineates the mechanisms that explain when reproduction and reinforcement will occur and when transformation will. Orlikowski and Robey (1991) for example, provide no indication for when users will conform to the technology's embedded rules and assumptions and when they might undermine them (see quote, Section 2.3.1, p.82). Similarly, Walsham in his proposed social choice model for IS, concludes:

> "Technology does not determine social direction, but rather social stability and change arise from a myriad of personal choices.[...] Computerized systems may be associated with the reinforcement of existing social structures, but may also be associated with significant social change" (Walsham 1993a, p.243).

The question of when IS will be associated with one or the other remains unaddressed. Our analysis suggests that structures are reproduced when groups of agents wish to reproduce them or when agents are trapped into replication by them - they cannot do otherwise. Structures can be transformed when groups of agents intentionally wish for a change or when a change in one structural property acts as a medium for further interaction.

Whether the interaction between agents and IS will intentionally affect structure in any particular case depends on the interplay between the groups of actors in the organisation that want to reproduce and those that want to change structure. This approach could be regarded as similar to the organisational politics perspective as formulated by Knights and Murray (1994). Although we point to the need to appreciate the existence of multiple groups of actors, with possibly conflicting interests and motivation, we strongly disagree with their perspective which deflates organisations to the continual individual and collective struggle to secure a share of the material and symbolic resources organisationally available. Such a view affords too little importance to structure and thus the stability of social relations, while strongly lapsing into voluntarism. Furthermore in their perspective, all action is guided by efforts of organisational agents to achieve and reproduce positions of symbolic and material security, which are by nature highly individualistic and

subjective, thus making consensus and cooperation impossible. Yet without the possibility of forming groups of actors, individual agents have very little power indeed.

Our perspective emphasises that IS can also have an unintended impact on structure by linking an intentional transformation of social practices to a broader or narrower context of interaction. The specific role that IS seem to play in organisational transformation is discussed in the next section.

7.3.3 IS and organisational change

The topic of IS and organisational transformation has been one of the most popular themes in both the IS and organisation studies literature (Applegate 1994; Lloyd and Whitehead 1996; Markus and Benjamin 1997; Orlikowski, 1996a; Yates and Van Maanen 1996). As Yates and Van Maanen (1996) note though, research on this topic has "often predicted new forms of organisations without focusing on how to get from here to there" (p.1). The analysis presented in Section 7.2 has attempted to address both the questions of whether technology can indeed effectuate organisational change and of how this happens. Our perspective can contribute in this debate mainly in two ways: firstly, by providing an alternative model for organisational change based on structuration theory, and secondly by putting forward a new conceptualisation of the role of IS in organisational change.

There are numerous models that inform our understanding of IT/IS and organisational transformation (see e.g. Knights and Murray 1994; Orlikowski 1996a) and some of them are more or less adequate depending on the research question at hand. We believe that a perspective based on the notions of reproduction and transformation could be valuable in the study of organisations and their practices. To summarise, such a perspective argues that a balance needs to be maintained between reproduction and transformation of structural properties, by some action maintaining the status quo while some other initiating transformation. These two directions should be seen as complementary rather than opposing, since both are necessary to

maintain a balance between the individual and the organisation. If there are mainly reproductions of structural properties, then organisational members are likely to feel powerless in front of the persisting structure (such as in the large bureaucracies). If on the other hand, transformations are very frequent then the organisation is likely to become highly volatile and lose its stability of social practices.

Although reproduction and transformation are likely to coexist, various factors come into play to determine whether a particular action will reproduce or change a structural property. These have to do with the agents' knowledge about the property, the attitudes towards it, the vested interests in reproducing it and the objective capacities for changing it. Apart from these 'internal' factors that are closely linked to the organisation itself, there are some rather more general conditions that are pertinent to change. These are pressures from other groups of actors, general instability of relations and practices, the dialectic of control within the organisation (which refers to the ways by which less powerful agents can exert control over the more powerful, Giddens 1984) and opportunities to capitalise on change (Archer 1982). All these mediate agents' actions and will ultimately mediate transformation.

This model for organisational change, emphasising the need for balance between reproduction and transformation, can serve as a guide, as the central principle, in efforts for organisational change. Excessive reproduction or transformation can be detrimental and the organisation should pursue a balance between the two at all times.

This model has numerous implications for all aspects of an organisation: from strategic planning and new technology introduction to organisational restructurings. These ideas can also be usefully applied as an analytic framework to both a macro and micro level, on the organisation as a whole and on subsets of its social system. The balance is also critical in the introduction and use of IS in an organisation so that agents do not feel either overwhelmed or constrained by the technology (as in the case of Blue Circle

Cement, where users complained about too much transformation initiated by the IS department constantly interfering and changing their work practices).

Nevertheless the most interesting implication for IS in organisational change lies elsewhere. As a result of our analysis an additional insight into the role of IS in transformation was developed. IS can facilitate unintended transformations of structural properties because they link broader and smaller contexts of interaction within the organisation. Every moment of the production of action contributes to the reproduction of structural properties of larger social systems. Thus a transformation in either a smaller or broader context of interaction can serve as the medium for activities in the other. Therefore an intentional transformation that is achieved through an IS, is likely to be transferred to another set of interactions since the same information system spans both sets.

Secondly, the way a particular information system is implemented in an organisation defines a specific system of relations between actors, a 'network' of roles and relative positions. This new perspective sees the organised access to information that a particular IS defines, as a network of social relations between members of the organisation. This system of relations stands in addition to the other social subsystems that exist in the organisation such as the ones defined by the hierarchy or job definition and so on, although it does not necessarily map on any of them. In this system of relations, members' position is defined not by their hierarchical status or by their job title and function, but rather by their ability to access, input, only read or change data in an information system. This ability which, as we saw in previous chapters is provided and legitimised by the organisation, acts as a signal and symbol for their authority and relative 'importance' in the overall social system. A simple change in this network of relations is monitored by its participants and defines a perceived change in the social system of the organisation, which acts as a medium for transformed structure.

This theoretical construct could be seen as indirectly linking into the work of Feldman and March (1981) who discuss information gathering as a signal and

symbol for effective and rational decision making in organisations. Nevertheless our argument is very different: the emphasis is on the information system as defining a system of relations whose changes are due to access to information acting as a symbol and signal in an organisation.

Thus this capability of IS can be employed within organisations to bring about intentional changes to their system of relations. When in organisational reforms relations need to be affected, hierarchies need to be restructured or departmental relationships redesigned. With small changes in the network of relations that is defined by an established information system, similar changes – although perhaps not so strong - could be achieved in an easier way.

The above suggest that IS can play an important role in organisational transformation and a new conceptualisation of this role has been proposed. This original view of an IS as defining a particular system of relations contributes to the IS field in the way that Walsham has defined as "development of concepts" (Walsham 1995). This is coupled by our contribution of rich insights in the areas noted above. Apart from the contribution to IS theory though, our analysis of our research findings has some interesting implications for IS practice.

7.4 Implications for IS practice

The idea of the reproduction circuit although theoretical, seems to be also well grounded in practice. A better understanding of how IS can be involved in attempts to intentionally transform structural properties can be valuable for organisations that are trying to achieve better IS support for empowerment. The way that these intentional interferences were carried out in our two case studies is discussed in the following sections. Furthermore the notion of the interplay among multiple groups of actors with varying capabilities and motivations for transformation is elucidated further through our findings, since this issue is likely to assume paramount importance in practice.

7.4.1 Managing the reproduction circuit

As employees now frequently interact with IS, they reproduce the structures of their organisation that mediate this interaction. However agents according to structuration theory, reflect and theorise about their actions and therefore understand what they are doing. This can also result in attempts to control conditions of system reproduction over time (Giddens 1984). This can be conceived in terms of a 'homeostatic process' which involves the operation of causal loops where a range of unintended consequences of action feed back to reconstitute the initial circumstances. A very interesting point is made here by Giddens who notes that in many different contexts of social life:

"strategically placed actors seek reflexively to regulate the overall conditions of system reproduction either to keep things as they are or to change them" (Giddens 1984, p.27-28).

These processes which he calls processes of selective 'information filtering', mediate the feedback loops and thus differentiate them from the more mechanistic mode of system reproduction that is found in natural organisms. It is this mechanism that allows organisations to be capable of being governed purposively and reflexively through time (Whittington 1992).

It appears that based on the evidence of the manufacturers we visited, these "strategically placed actors" are more likely to be senior managers - particularly the ones involved in strategic issues - that have a broad overview of the current organisational situation and an idea of where they want the organisation to be in the future (Schein 1994). Lower level employees on the other hand, are usually under significant pressure from day-to-day issues that forces them to confront the institutional features of their organisation in a reified way, ignoring that it is their own actions that produce and reproduce them (see Chapter 2). In matters regarding information systems, this attitude is aggravated since most employees in manufacturing companies, as our findings suggest, have not yet developed an extensive understanding of the systems to allow them an active involvement. As a result when it comes to IS and empowerment, managers are the ones that have the most control over the reproduction circuit.

Our research revealed some unexpected dimensions in the role that senior managers - and in particular IS managers - play in intentional transformations of structure. IS managers seem very aware of the reproduction circuit and may intervene intentionally in various ways to transform the organisation according to their strategies. This 'intentional interference' to break the reproduction of work practices but also - inevitably - structures, was evidenced in both cases. IS are once more found to play a particularly interesting role in the reproduction circuit; this section emphasises the more practical dimensions of this role.

Information systems as a catalyst for change

In the case of Blue Circle Cement, it is the interaction between employees and IS that is clearly seen as the critical element for change:

> "Equally I think a lot of those systems you put in, in themselves don't make the change. Your objective is to change working practices, improve the way of doing things, improve empowerment and you *reinforce* that with the IT system, but not the other way around. So to try to put that simply, there are a lot of cases where we put in systems where actually you could make the vast, the major benefits *without changing* the IT systems. They are a change of working practice but you reinforce that change, you are trying to move people forward and then underneath them you put the IT system so they can't fall back again. But it's important I think to understand that, that it isn't a question we say "Oh, let's have a new IT system so that people can buy into it", it's more a question "we want to change working practice, that is what we want to achieve, this is how we want people to operate, now let's see if we can reinforce that discipline by putting the IT system" (Group IT Controller, Blue Circle Industries, emphasis added).

Undoubtedly the "we" in the above quote refers to the senior managers and their intentions, whereas the recipients of their efforts are the employees. The division in the company is quite clear. As the company has moved on from the initial automation phase, a new rather more complementary role between IS and work practices is beginning to emerge:

> "the first systems we computerised were systems where clearly there was demonstrable benefit by automating things that were done manually. Most industries have left that behind and what we are looking for is a lot more subtle changes and in making those changes - I think certainly in the industry that we are in - that the changes are changes in working practice which really are management-driven and the computer systems are being forced into those changes rather that lead the changes. This is a subtle distinction" (Group IT Controller, Blue Circle Industries).

In the case of Blue Circle Cement the introduction of the new IMS system played a central role in the attempt to change work practices. The interaction

between employees and the information system reinforced a change in work practices which would have been difficult otherwise.

> "This big IMS system is very much the case in point; I have known since the onset that the actual cost justification itself, the benefits do not stack up in isolation of the change in the working practices. I'll explain this role, but we could make the changes in working practices without altering the computer system and get 80% of the benefits in broad terms. However people are reluctant to do that; they want a peg to hang their coat on, so we reinforce that change with a new computer system and then people are more susceptible to change and will say "well I am doing it because of the new computer system". You're trying to sell the change through the computer system rather than the other way around" (Group IT Controller, Blue Circle Industries).

Employees seem reluctant to change their work practices and break the reproduction circuit of the structures of the organisation. IS managers appreciate that the interaction between employees and IS will strengthen the change in work practices as the latter begin to use the new system and reinforce the new situation. Hence the new system is introduced to serve as a lever for changing practices.

> "And we wrestle in the Steering group because we will be spending a hell of a chunk of money, which on one side, if we could get commitment, we could actually make the changes with the existing systems a lot of them" (Group IT Controller, Blue Circle Industries).

The information system serves as a catalyst in affecting a change in work practices that are usually continually reproduced.

> "It's not always black and white whereas let's say if you take the other extreme, the old days we put in payroll systems it was the other way round, it was very clear "this is displaced, this is how you now work in future, end of story", it's led the other way around. This is a bit more subtle, this is trying to change the working practice and then as you move the working practice up there you slip something in underneath so they can't drop down again. It's a catalyst for the change" (Group IT Controller, Blue Circle Industries).

Similar issues were echoed in other companies (e.g. in Rover) that are involved in changing long-standing work practices. IS managers claim that a change in work practices could be achieved without necessarily a complementary change in IS, but users do seem to develop a dependence on the systems they use and the latter act as an anchor or a lever for any changes.

An information system from outside breaks the reproduction circuit

This 'anchoring' role of IS is also evident in BICC Cables: the interaction between employees and IS becomes taken for granted through everyday use and even when they want to introduce a new system, users tend to want the same thing, continually reproducing the structural properties and the way in which these are translated on the level of action.

> "I also think that one of the problems about developing bespoke solutions is that if you go and ask a guy what he wants, Erith is a good example of that, he'll say 'well what we want is a new system that's just like the old system'. [...] i.e. people don't think about doing things differently, people just tend to say 'we want the same thing' and there maybe a better way of doing things. So I think that's the last bit, certainly about people buying a package, it actually forces you sometimes to challenge that. If you don't challenge that, what you end up doing is putting a lot of customisations into that package (IS manager, BICC Cables).

In BICC they have often experienced changes in IS due to the desire for new technology, but the feeling seems to be that when the new information system is developed within the organisation as a result of the collaboration between users and the IS department, they end up reproducing the existing practices and structural properties.

> "[...] if you try and develop your own solution you tend to get locked inside" (IS manager, BICC Cables).

In the case of BICC Cables we see a slightly different role of IS in the reproduction circuit: the company looks to the introduction of a software system built outside the organisation to break the reproduction circuit and get employees to rethink their work practices.

The recent change in market conditions in BICC made the company need to change its structure from a loose network of national organisations to one based on market sectors across Europe. In this new tighter structure they need to have better control and co-ordination amongst the sites and therefore more information on the various aspects of operation. This created the need for appropriate information systems and made IS a strategic issue for the organisation (Ives and Jarvenpaa 1991; Neumann-Alkier 1997). It is clear that the decision to implement a common, pan-European system is determined by the organisational conditions:

"The company is looking at an enterprise system through Baan and that is going to be developed and rolled out to two units. The idea of that is to pan-Europeanise, globalise the organisation, quite rightly" (Financial Controller, BICC Cables).

We should clarify that the introduction of the Baan system is not done to promote empowerment; now that the company needs to compete on a pan-European scale, they need a common culture and common ways of doing things. The managers want to change work practices but also they want to affect the institutionalised features of the organisation (e.g. they want to bring down the culture barriers, they want to bring people in the different countries closer together and establish commonalities across the organisation). Nevertheless the new system does indicate an interesting role that an information system can play in the reproduction circuit.

The main intention behind this is the desire to standardise operations and practices across the units and national companies, the IS department at the Head Office is trying to avoid customisations on the package as much as possible. In this approach, they are looking to smooth out large differences in working practices and get units to rethink how they work and gradually move towards a common set of best practices. This does not necessarily mean that the company will enforce the processes that the package prescribes on all employees. Before the selection of a system, operations and processes were analysed in detail to establish the requirements of all activities, which then formed the basis for system selection.

Thus the introduction of a package - at least in the way the IS management at BICC have approached it - will make people think about how they work and whether they could do something differently. A system that has been developed outside the organisation challenges the way the structural properties are translated into the everyday interaction of agents and even though its implementation could still reproduce them, it can serve as a trigger for agents to stop the reproduction circle and think about what they are doing.

Thus the introduction of the package helps them to rethink their work practices and serves as an opportunity for change rather than as a causal

agent of change. In this case it seems that the system coming from 'outside' the organisation which is not based on their structural properties is complemented by the desire to standardise and rethink their work practices. Thus it does not mean in any way that the introduction of a package will always serve as a trigger for change, but it can serve as a break in the reproduction circuit if the organisation employs it in that way. Again it can also be employed as an 'excuse' on the part of IS managers to affect employees' work practices more effectively than it might have perhaps been possible without the system.

Another point worth remembering though is one related to the interpretive flexibility of the Baan system. Orlikowski notes that the greater the temporal and spatial distance between the construction of a technology and its application, the greater the likelihood is that the technology will be interpreted and used with little flexibility (Orlikowski 1992a). Now furthermore, as in BICC they want as few customisations as possible, the employees will not be engaged in its constitution during development and use. This limits the control that employees have in their interaction with the information system and will probably hold negative implications for its support for empowerment.

The examples from both cases display the subtle, yet powerful role that IS play in organisations: the use of an information system can reinforce a change in work practices and prevent employees from falling back to the old practices. The introduction of a new information system can also serve as an opportunity to rethink work practices and break the continual reproduction circuit which the use of IS seems to promote.

7.4.2 The design of IS for empowerment

According to structuration theory the mechanisms of 'stretching' the conditions surrounding social practices in modern societies tend to involve reflexive monitoring.

"That is to say, understanding the conditions of system reproduction becomes part of those conditions of system reproduction as such" (Giddens 1984, p.191).

As the case evidence suggests in Section 7.4.1, the understanding that managers have of the interaction between agents and IS feeds back into the reproduction circuit and becomes part of the conditions of social reproduction for the future. Although their intentions might not be fully realised since many other circumstances might come into play, the need for interference confirms the principle of the reproduction circuit.

The reflexive monitoring of the interaction between human agents and IS, that particularly IS managers engage in, seems to inform the management of IS in both case organisations. The reproduction circuit that was employed in Chapters 5 and 6 in order to capture the reasons why organisations are facing quite so many problems with the support of IS for empowerment appears to also explain wider issues relating to the role of IS in the change of working practices. Our research findings suggest that IS managers implicitly understand the reproduction circuit quite well, and employ it in their conscious efforts for organisational change on both the levels of action (work practices) and structure. However what seems unclear and deserves perhaps more serious consideration is the way in which lower-level employees are involved in intentional transformations of structure, and their motivations, attitudes, interests and objective capacities for change. This final section attempts to elucidate these perhaps conflicting positions and unbalanced capabilities between the two groups of actors.

The involvement of employees in intentional transformations appears in general difficult. For example, Rover are facing particular difficulties in an attempt to come up with the requirements for new IS that will support empowered teams on the assembly line making decisions about the content of each car.

"Probably the biggest single problem we've had implementing this has been junior management interpretation of the need to support the concept. They have been very heavily engaged in this problem of: 'this is the way we do it now, we know we have to change, but I can't see another way to do it so can you support what I'm doing now as opposed to the way you think I need to do the job in the future'. So in effect there has been a sort of huge - it isn't resistance to change, they recognise the need to change - it's a sort of ability to envisage the environment they are going to be in when they're actually asking for what they need in detail. There is frequently an inability to visualise

the information systems role in the new work process because employees feel that they cannot change their work practices until the systems that support them change, and 'if you provide the support I need for my current process, then I can't change my process'" (IT strategy manager, Rover).

These difficulties are accentuated as in Rover, IS strategy and planning are extremely tightly coupled with business strategy (Periasamy 1994).

Employees seem to feel locked into their current work practices by the IS they use which tend to reaffirm and strengthen existing practices:

> "there is an expectation in our customer base that every business change drives an IT change.[...] Doesn't always happen, but the assumption that it will always happen is there, and I think that's probably bad for empowerment because it actually says 'I can't change my practice until you change your systems' so there's flips of ideas that they feel locked into current practice by their systems. It is a big thing to move away from where you are" (IT strategy manager, Rover).

It would appear that IS play a role as a 'barrier' for change or for falling back to old practices, by locking employees through their everyday use in existing practices. This could be because, as noted in Section 7.2.4, the use and interaction of employees with IS is one of the many elements that help to define an employee's role and position within the network of relations in the organisation. Therefore it may be very hard for them to envisage new practice and new structure or fall back to a different practice, while existing IS reinforce existing structure.

Undoubtedly other issues come into play here as well, such as whether employees (including middle managers) really want the change towards a more 'empowered' practice (motivation), or even whether the new ways of working that employers are promoting as empowering are indeed that or not. Fear and uncertainty are always strong determinants of employee attitudes towards change in the manufacturing sector, and are likely to remain in the background of the picture. Or it could simply be that employees are just not used to being able to define a change when for years they have been shut out of the transformation process:

> "So I'm not sure that the empowerment [regarding their needs for systems] ever really does come from them, unless it's the odd few. It really either comes via BCI [Blue Circle Industries] or we change the systems" (member of the IS department, Blue Circle Cement).

Employees cannot be expected to suddenly escape from the role in which they have been placed for so many years. Thus it is much easier for senior and IS managers to complain that once they 'allowed' employees to show initiative and say what they want to change, the latter fail to come up with their exact requirements. Employees - particularly in traditional manufacturing companies like the ones we studied - will need significant support to be able to define IS that can support them in relation to empowerment. Our evidence suggests that employees are still far from being able to make such IT-related decisions. Whether IS managers are willing and able to support employees in this sense is questionable.

"I think they [IT people] find it very difficult to actually bring back the idea of empowerment back into the workplace, because I think they see their traditional analyst programmers, see them as programming, team leader roles, as being very job specific in terms of, this is what your responsibilities are, generic job descriptions that go with the business" (Personnel Manager, FMCG manufacturer).

Recently there has been considerable growth in the IS literature that examines the role of IS managers in acting as change agents (Feeny and Willcocks 1998; Markus and Benjamin 1997; Rockart et al. 1996). Our own findings are far from conclusive on the issue: undoubtedly for the majority of IS managers in manufacturing this is not easy and it will depend on many factors (Rockart et al. 1996).

"So we try to treat our users as customers, that's fundamental, although that's not easy for everyone to buy into. That's one of the issues we're trying to wrestle with at the moment. Some people have always worked at the centre and have not been exposed to user services and cannot quite see the customer as a customer" (IS manager, BICC Cables).

There are however, encouraging signs: interviews in one manufacturing company where empowerment seems to have penetrated manager attitudes, suggests that IS managers are learning to accept new ways of thinking about practices.

"We have this problem, you know, stock isn't right in point one. Why isn't it right in point one? Because somebody moved the material there and didn't tell the system. Why did he have to tell the system? Well, because **he had to,** would be the old style. Nowadays the answer is 'well, that's a good question. I don't know. Maybe he didn't need to tell the system'. I think it's [...] about **attitudes in managers' minds,** a lot of it. An awful lot of it is like that. And I come from that school, I've been here in this plant. We all have that. It's also, I think it is, the process is extremely challenging because in letting go, you have to be prepared to acknowledge that your solution in your head isn't the only solution. And probably isn't the best solution. And even if it is still in your own mind the best solution, does it matter? Those are very difficult things, I think, for managers to get

to grips with. You know. As soon as you say to somebody, 'no, I'm not going to do it that way, cause I know better', they won't come back with another idea. And maybe, you know, for the little bit better you think, it might not be better than your solution, it doesn't matter. It really doesn't matter. But our mindset is, 'well, I know best and I want it to be done this way'. Well, traditional mindset anyway (IS manager, Leyland Trucks, emphasis added).

This change in attitudes needs also to be demonstrated in practice. In Leyland, a document that travels with the vehicle as it is being built is produced by IS. This document has been problematic and needs replacing, but for years nobody has been able to come up with a better solution. As the empowerment principles began to affect work practices, a multifunctional team was formed to come up with a better solution:

"So that the people who are the customers of that document, who use it, are empowered now to go and try and come up with what their real requirement is, and think laterally, and forget about the old document.[...] So that wouldn't have happened five years ago" (IS manager, Leyland Trucks).

Nevertheless this example is most certainly an exception. Although similar developments were evident in one or two cases, for most companies the necessary change in both employees' and managers' attitudes is still far from being present.

7.5 Summary - Conclusions

Concluding the analysis of our empirical data, this chapter initially brought together the findings that emerged from the three different research efforts (survey, interviews and case studies). Through a detailed cross-case study of our two cases, the reproduction and transformation of structural properties that constrain empowerment was further understood. The need to explain reproduction and transformation demonstrated the limitations of our model based on structuration theory and we resorted to further elaborations of structuration theory in the social sciences. Section 7.2 outlines an improved perspective on the role of IS in organisational transformation which stretches beyond empowerment. The perspective is grounded on the analysis of our empirical data and holds some valuable implications for IS theory and practice. More specifically it contributes to the application of structuration theory in IS by providing original insights as well as ideas already developed in the social sciences. It also contributes to the debates on the impact of IS on

structure and the relationship between IS and organisational change. The claim that the interaction between agents and IS can indeed transform the structural properties of the organisation that constrain empowerment, and thus 'empower' employees, is supported.

Regarding IS practice, although such transformations can probably be found in most organisations, the reproduction circuit appears to be the most potent reality in organisational work. Senior IS managers understand this role that information systems can play and were found to intentionally interfere to regulate the conditions of reproduction. The approach that employees on the other hand, take towards the role of IS in the reproduction circuit is unclear. They seem to feel 'locked' into current practice by the use of existing IS and are reluctant to abandon the reproduction of existing structures, possibly in fear of what those new structures might be. Our evidence suggests that the change towards different IS practices that are perhaps better 'matched' to the empowering organisation is quite difficult for most companies.

In breaking from the reproduction circuit employees are likely to require support from the IS department and line managers in order to visualise and define the new structures that will strengthen their empowerment. At the moment IS managers in manufacturing, do not seem capable of fulfilling such a difficult role. Thus considerable time and effort is needed to change the attitudes of all those involved and develop information systems that trigger transformations in the structures that constrain empowerment.

CHAPTER EIGHT

CONCLUSIONS

This concluding chapter of the thesis summarises the main steps in the research effort, outlines the main findings and assesses their potential contribution to knowledge, in theoretical, practical and methodological terms. In the last three chapters, emphasis was largely placed on understanding the mechanisms behind the reproduction and transformation of structures that constrain empowerment, through the interaction with IS. This final chapter widens the focus and also discusses our findings regarding the adoption of empowerment in manufacturing. It evaluates the research process and identifies its major limitations, and highlights some issues for further research.

8.1 Overview of the research

The objective of this research, as outlined in Chapter 1, was to understand the role of information systems in relation to empowerment. Empowerment is

generally regarded as a promising management approach that depends significantly on information systems, thus offering interesting opportunities for the information systems field. Empowerment has been widely discussed because it seems to provide an effective solution to the concerns that organisations are experiencing. A review of the literature on the topic demonstrated some ambiguities in the current interpretation of the concept in management, and some distortions of its main ideas in the practical implementations in organisations, particularly when these take place within change initiatives such as BPR or TQM. A critical analysis of these issues which was presented in Chapter 1, is a useful input to the IS field. We subsequently argued for an interpretation of empowerment based on the decentralisation of decision-making authority to the people who actually perform the basic work of the organisation, and highlighted the need for reciprocal involvement of both the individual and the organisation in the process.

Although there is a considerable number of publications noting the importance of information for empowerment, very few have explicitly addressed the role of IS in empowerment. Therefore in order to outline the research problem, we resorted to two broad streams of IS literature that seemed most relevant. The first addresses the impact of IS on organisational structure and the second examines the effects of IS on individual employees. Even from this early point in the research, it became evident that both empowerment and the role of IS in relation to it need to be approached at two levels: the level of the individual and the organisational level; the level of agency and the level of structure. Based on the literature review, the research question was refined and was refocused towards regarding the role of IS for empowerment as supportive rather than initiating. Hence one of the starting points of the research was that IS cannot cause decentralisation of decision making and thus cannot empower employees. IS can support employees in their tasks and responsibilities - and in this way support empowerment – but they can also constrain them depending on the particular organisational conditions. The social conditions in which IS are built and used are critical for their role in empowerment. Chapter 1 concluded with an original classification of the

dimensions of the potential support of IS for empowerment, which along with the systematic evaluation of the existing research on IS and empowerment provides an original contribution to the IS field.

Building on the importance of the social and organisational conditions for IS support for empowerment, Chapter 2 discusses the development of an initial conceptual framework linking IS and empowerment. The framework demonstrates that the IS of an organisation are developed and introduced taking into account the specific organisational characteristics. The adoption of empowerment is likely to signify changes in these characteristics though, and therefore since IS cannot instantly reflect these changes, problems may arise. The extent of the problem is likely to depend on the specific IS, and the institutionalised characteristics of the organisation that have been embedded in them. Although this conceptualisation was helpful as a first approach to the issue, and was used to guide initial data collection, it was soon proven too broad and non-propositional. What the framework essentially proclaims is that the institutionalised features of an organisation are likely to be important in how IS will support the new situation created by empowerment. It cannot shed light into why this happens or explain how we can assess this support. As our ideas developed through empirical data collection and analysis, a second conceptual model was constructed based on structuration theory. Structuration theory points to agents as being responsible for reproducing the structural properties of their organisation, and emphasises the mediating role of structure in everyday human activity. Thus it was found to substantiate and support our initial ideas, while at the same time providing some conceptual means to take them further.

In the process of developing this model, the applications of structuration theory in the IS field were reviewed, and thus Chapter 2 makes an interesting contribution to the IS literature by providing a comprehensive review and assessment of interpretations of structuration theory in IS. This could be valuable as a starting point for IS researchers wishing to apply the theory in the future, since structuration theory is becoming increasingly popular in the field. The insights from the review and the study of the principles of

structuration theory were incorporated in a conceptual model which shows that, through their interaction with IS during IS development and use, agents reproduce the structural properties of their organisation which mediate this interaction. The model serves as the primary analytic mechanism in our research and was specifically employed in the analysis of the two case studies.

Chapter 3 described the methodological approach that was used, based on the philosophical assumptions of the author. The chapter argues for a combination of quantitative and qualitative research methods that can capture both broader and more detailed social contexts. As the need for explanation and understanding 'how' and 'why' questions became greater in the course of the research, we moved from a survey that was descriptive and highly exploratory to a series of in-depth interviews that provided more detail, to in-depth case study research where the understanding of the entire situation enables rich insights into relationships between issues and concerns. In the final section of the chapter the three stages of the research design are described, suggesting how a mixed method design can be operationalised in practice.

Chapters 4, 5 and 6 present the empirical research findings. Chapter 4 summarises the survey results and discusses the interview findings that relate both to empowerment and to IS support to it. The survey findings suggest that manufacturing companies have indeed been involved in various changes aimed to improve their work organisation, which have often resulted in employee empowerment. In the companies that are involved in empowerment, the primary changes in employee responsibilities are related to looking for improvements and solving problems, additional quality responsibilities and workload planning and scheduling. Managers perceive the adoption of empowerment as rather successful, although they note the influence of many constraining factors such as the traditional division of tasks and the hierarchical management structure. Regarding IS, managers feel that they can indeed provide support to empowerment, but also highlight technical and staff-related issues as negatively mediating this support.

An interesting feature of the chapter is the interpretive analysis of the respondents' own comments in the questionnaire. This analysis yielded some thought provoking quotes and valuable insights in the personal views of the respondents, which cannot be captured by a standard questionnaire with closed-form questions. This analysis has been reported only in one other research effort in the IS field, that of Markus (1994) and therefore our work contributes to what we think can be a very valuable technique for interpretive data collection.

The findings from the series of in-depth interviews firstly provide interesting insights into empowerment. Companies adopt a wide range of approaches to empowerment depending on their particular context and organisational characteristics. In general it appears that empowerment is not promoted merely for its sake; even in the cases where downsizing is involved and it seems that employee empowerment is in a sense "inevitable", empowerment is perceived as an enabler to meet the company's business strategies. In fact the promotion of empowerment because of business reasons seems to be a common point across companies. This comes in sharp contrast with our initial expectations that tended to regard empowerment as more effective if it was underpinned by more 'social' concerns.

A tight and well-defined link between business goals and empowerment seems essential to ensure the company's commitment to empowerment. Not all companies have reached that level of maturity yet though. Particularly in promotions of continuous improvement and total quality, empowerment is frequently seen merely as one of the underlying principles and as such, our findings suggest that it can be underplayed.

Although empowerment has to be seen as an enabler for the company's business objectives, there is a parameter that comes into play in the relationship between empowerment and its success: that is time. Empowerment and the changes it entails are a process that is lengthy and difficult and, as such, usually demands a lot of time. If a company is under

pressure for empowerment to demonstrate quick results, then they might be disappointed when at year's end the results are not what was expected. Results are likely to accrue over longer periods of time.

Time is one of the many parameters that come into the issue of success. Indeed success varies greatly: some companies appear quite successful in their approach to empowerment, while others accept that a lot of work remains to be done. However we are skeptical about evaluating and assessing empowerment based on some external, academic criteria that are largely informed by the results of companies in different contexts and particularly the USA (see e.g. Lawler et al. 1995). Most research and knowledge on empowerment tends to be based on the 'American' experience which can be dramatically different to that of British companies (Kochan and Weinstein 1994). The British manufacturing industry has a long history behind it and its background is not directly comparable to large US corporations (Batstone 1984; Millward et al. 1992). For such reasons we feel that an evaluation which is based on internal and rather more 'esoteric' criteria could be more helpful. Regarding this final point, most companies use their past practices as an indicator of their progress, and indeed in most cases they believe that they have made considerable headway.

In our interviews, company 'propaganda' related to empowerment was surprisingly limited. Both in the terms they evaluated their success and noted the constraints, managers seem very aware of the difficulties and pitfalls that empowerment entails. They also seem particularly aware of the knowledgeability and cynicism of employees regarding the latest management-led change initiatives such as BPR or TQM. This 'maturity' seems to characterise both management and staff in British manufacturing, whose attitudes have undoubtedly been forged through the last three decades of difficult industrial relations. These appear far removed from the naive and gullible stereotypes that the popular business press portrays.

What emerges from our data though, is that the more successful promotions of empowerment are firstly, underpinned by a solid business rationale and

secondly, have affected many organisational elements and effectively mobilised both individual agents and structure. Empowerment needs to address both dimensions in order to be successful. Even if employees are motivated and highly skilled, if they work in a highly structured, constraining environment where they do not feel that they have got the power to take decisions for themselves, they will conform to that and empowerment is unlikely to succeed. On the other hand, if structural elements change and employees are not triggered through, for example, recognition or rewards for their activities, they may not respond to the possibilities that are opening up for them. Apart from employees though, the need to address the personal concerns of senior and middle managers is also fundamental for empowerment success (see Chapter 4). Hence empowerment has a lot to do with the agency and structure duality where if the one is affected then the other has to be too. Nevertheless it is very difficult to consistently mobilise both agents and structure, and consequently the balance is not always maintained.

The interviews also provided data on the way information systems are used in support of employee responsibilities and on the particular difficulties that emerge. Our findings confirmed that IS do not lead to employees becoming empowered, but they are a necessary tool in their jobs. IS can affect the nature of tasks and the way they are performed essentially through decision making support, access to general information, task facilitation and automation, and ease of communication. They can support employee decision making essentially through the provision of information and the facilities to analyse it and understand issues better (e.g. by the use of spreadsheets or graphs). In contrast decision support tools and other similar facilities do not appear to be widely used by employees. IS also provide access to general information (complementary to traditional paper-based or other communication systems) which can promote employee interest, involvement and understanding of the business. Also IS can support business performance reporting which, when detailed, can act as feedback and help learning, and, when more general, can make employees feel more of a 'party' to the business situation. Similarly IS can facilitate communication among

employees, teams and departments, and can automate many time-consuming tasks.

Nevertheless, although in many cases IS prove to be of value to employees, the research revealed a series of problematic aspects that employees face in their attempt to use existing IS effectively. These constraints relate to limited access, information inadequacies, systems' architectural features, the amount of prescription embedded in a system, other technical difficulties, inadequate user skills and attitudes towards IS, and finally, the IT department of the organisation. These problems appear to be due both to the way IS have been designed and built, but also to the established and institutionalised ways they are being used in each organisation.

Since the series of interviews involved at the most two interviews in each organisation, they were unable to provide more detail and possible explanations for the problematic IS support. These were sought in two case studies of manufacturing companies in the UK, which revealed the complex dynamics surrounding IS support and the encouragement of employee empowerment. The cases also provided rich insights into the empowerment process in two different manufacturing sectors, which were discussed in detail in Chapters 5 and 6.

Regarding the support that IS can provide to employees, both case studies confirmed that IS are perceived as a valuable and useful tool. Nevertheless similar constraints to the ones identified in the series of interviews, emerged in the case studies too. A case analysis based on the structurational model developed in Chapter 2 was carried out in each case in order to explain these constraints. The analysis revealed that the existing IS often prove inadequate in supporting the new work practices, because the interaction between agents and IS continually reproduces those structural properties of the organisation that still constrain empowerment. This interaction refers to the design, development and the introduction of IS by the IS departments, as well as to the use of the systems by employees in their everyday activities.

Although the pattern of reproduction was dominant in both our case studies, a few instances were noted where the interaction between agents and IS seems to lead to a transformation of aspects of these properties. On a theoretical level these instances demonstrate that IS can affect structure and can therefore be said to empower employees. This means that an information system can be said to be supporting empowerment when its introduction or use entails changes in the rules and distribution of resources in the organisation, that are favourable to employees. Rules and resources express forms of domination and power, and therefore a change in their distribution that favours employees supports empowerment. This finding is in line with our analytical framework which based on the duality of structure, proclaims the inextricable link of agency and structure, yet it contradicts our (perhaps overly simplistic) starting assumption that IS cannot empower employees.

The mechanisms behind reproduction and transformation were analysed in more detail in Chapter 7, along with the role of IS in the reproduction circuit. Based on our own work and the critique of some social theorists, we argued that structuration theory does not adequately explain reproduction and especially transformation. By recognising and accepting the role of agents' intentions and motivations in both reproduction and transformation, and placing these within the organisational context where many groups of agents coexist, the reasons behind stability and change were highlighted. The analysis also provided an explanation for how action and structure are linked.

This linkage is easily understood in reproduction and intentional transformation of structural properties but appears more problematic in unintended transformations. Our analysis showed how actions to affect one particular property are observed by agents and act as a medium for further interactions in broader or narrower contexts of relations. The outcome is a changed structure but in a way which is likely to be highly unpredictable. Therefore the analysis explains how action can result in a change of structure, but can also indicate when action will result in change and when in reproduction. Transformation of a structural property that constrains empowerment through interaction between agents and IS, can be achieved

depending on the knowledge and attitudes towards it, the vested interests in reproducing it and the objective capacities for changing it. These factors can also be affected by certain contextual conditions, such as pressures from other groups of actors, general instability of relations and practices, opportunities to capitalise on change and the dialectic of control. Chapter 7 advances these insights on IS and organisational change and concludes by drawing out some implications for IS theory and IS practice.

8.2 Contribution of the research

This section discusses the contributions of this research and its implications for future work. The section is divided into three subsections addressing contributions to theory, methodology and practice. A contribution though that should be noted first is the successful bridging of ideas and previous work in three distinct academic fields: IS, management and social theory. Although IS is a multidisciplinary area and therefore such cross-sections are common, we believe that any piece of research that manages to combine concepts from different areas in an interesting way, contributes to the stronger establishment of the discipline.

A second major contribution lies in the topic of this research. The relationship between empowerment and IS is an issue which has received extremely limited attention in both the management and IS disciplines. Nevertheless as this research has shown, IS are indeed very important for empowerment, and therefore the better understanding of their role that this research provided, is valuable to the existing knowledge in information systems. Furthermore the placement of the research issue within the existing understandings of IS in organisations (e.g. IS and decentralisation, impact of IS on structure and individuals) can be useful for further research into empowerment and IS since the topic is so unexplored.

The third major contribution of this research is that it collected original data on the role of IS in support of the work practices of lower-level employees in UK-based manufacturing companies on a large scale. To the best of our

knowledge there has been no such previous effort and most work on IS in manufacturing is firstly quite limited, and secondly has concentrated on specific case studies. Both the survey and the series of in-depth interviews provided a broad overview of IS use in British manufacturing, which will be made more easily available to the academic community via future publications. The original data can be valuable as a starting point for future research into various aspects of IS use in manufacturing - beyond the empowerment focus (e.g. changing work practices, main IS functions, employee IT skills, constraints in IS use and so on).

8.2.1 Theoretical contribution

In noting the main theoretical contributions of this research we begin by highlighting the duality of structure and agency as a useful way to conceptualise the empowerment process. As discussed in Chapter 1 and as the data collected in the series of interviews and the case studies suggests empowerment necessitates the mobilisation of both the individual agent and the organisation. Instead of regarding empowerment *either* as a motivational *or* a relational construct (Conger and Kanungo 1988), we argue that empowerment should be viewed as both: enabling and motivating individual agents as well as delegating responsibilities and affecting structures. This improved conceptualisation highlights the changes that need to take place in order for empowerment to be successful and has particularly valuable implications for practice which are discussed in Section 8.2.3.

A second theoretical contribution to the IS field lies in the identification and analysis of the main IS support functions for employees in manufacturing. Although similar classifications have been proposed before (see e.g. Mentzas 1994) the originality in our taxonomy stems firstly, from the focus on the use employees make of the systems rather than the technology itself, and secondly, from the emphasis solely on employees and not on the entire manufacturing organisation. Coupled with the taxonomy, the research revealed the problems that arise in relation to these support functions and through the case studies provided possible explanations for them. These

constraints although directly related to empowerment are also of broader concern, and therefore their identification and understanding is useful for the IS field.

Regarding the application of structuration theory in the development of our conceptual model we note the following: our structurational model is similar to others previously developed in the field (see Chapter 2). It follows Orlikowski and Robey's (1991) suggestion for further research (see Chapter 2), and although it is in the same line of thought as Walsham's work, it focuses more on the interaction between human agents and IS rather than on the surrounding social practices (what Walsham (1993a) refers to as 'content'). Secondly, it is employed for a different purpose; Walsham uses structuration theory to:

"describe the way in which context and process are inextricably linked [...] the analysis aims to highlight some key elements in the structuring processes over time (Walsham 1993a, p.86).

Thus the main purpose of his analyses of the case studies through the structurational model is a richer description of the structuring processes over time; in our case studies the theoretical model is employed to explain why a specific problem occurs, so our goal is explanatory rather than descriptive.

The proposed model in this thesis can be useful for research focusing closely on IS use or development and although it is not original, it has some advantages over the existing ones (see in Chapter 2). Firstly, in relation to Orlikowski's model, as already argued, technology should not be equated to structure. As our research suggests it is rather the structural properties of the organisation and the way they are embedded in the design and use of the technology that both enable and constrain work practices and not the technology itself.

Secondly, the conceptualisation of IS within their interaction with human agents is superior to the conceptualisation put forward by Orlikowski (1992a) and Orlikowski and Robey (1991), as it does not undermine the importance of organisational structure. Such a conceptualisation facilitates the consideration

of the broader organisational context which impacts, and is in turn affected by interactions during the development and use of IS. This is a point also made by Walsham and Han (1991) who, noting a concern with the work of Poole and DeSanctis (1989) and Barley (1986), submit that:

> "the broader organizational context which reflects structures of signification, domination and legitimation will impact, and in turn will be impacted by, interactions during the use of the GDSS. The implication is that empirical work on specific case studies will need to take these broader contexts and their links with GDSS action into account" (Walsham and Han 1991, p.79).

Thirdly, the focus on the interaction of employees and IS rather than simply on the systems is better aligned with the view of the development and deployment of IS in organisations as a social phenomenon.

Moving away from the conceptual model itself, our application of structuration theory as an explanatory framework revealed some serious limitations of its theoretical positions which have not been previously identified in the IS field (see Section 7.3.1). These do not diminish the value of the theory for IS research, but rather usefully point to conceptual issues that IS researchers need to be aware of. Some of these issues have been pinpointed in the social sciences literature, but have consistently failed to be incorporated in the applications of structuration theory in IS. Hence a further theoretical contribution of this research, is that it highlighted some limitations of structuration theory and introduced insights from the social sciences into the IS field in order to deal with them.

Finally, the insights gained from the original analysis of the role of IS in the reproduction and transformation of structure presented in Chapter 7 constitute the main theoretical contribution of this thesis. These are valuable in formulating an improved perspective regarding the role of IS in organisational change and the impact of IS on structure, which was proposed in Sections 7.3.2 and 7.3.3. This understanding can apply beyond the structural properties that are relevant to empowerment, and can refer to other properties involved in organisational change. Therefore this analysis can apply to other issues, and not just to empowerment. Furthermore the understanding of reproduction and transformation is generalisable beyond manufacturing

industry since its basis lies in social theory. The improved perspective on the impact of IS on structure comes to enrich and extend the relevant existing work in four basic ways:

- it captures fully the reasons behind reproduction and transformation by taking into account both intention and unintended consequences of action
- it explains how action results in change of structure thus identifying the linkage mechanism between action and structure that was absent from previous conceptualisations
- it provides an additional insight into how IS are linked with both action and structure by highlighting that IS span across broader and narrower contexts of interaction and by the conception of an information system as defining a system of relations between agents
- it proposes specific mechanisms for indicating when reproduction will occur and when change will.

Moreover an alternative model for organisational change is proposed based on our analysis, which argues that the need to balance reproduction and transformation must serve as the central principle in organisational change. This model can be useful for the introduction or development of new IS but is applicable also as a broad guideline for changes not involving technology.

8.2.2 Methodological contribution

The first methodological contribution of the research lies in the interplay between two different units of analysis: the individual and the organisation. Due to the nature of the research topic, the focus was continually shifting from one level to the other, building a multi-level analysis combining the macro and micro levels (Markus and Robey 1988). Even as early as the development of the conceptual framework in Chapter 2 it became obvious that mixing levels of analysis would be necessary: the research question started off accepting IS as only relevant to agency (they can support individual employees' responsibilities, but cannot empower them), only to find that the organisational characteristics were critical for this support, and finally to conclude that IS can

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indeed affect structure. Thus our research is a clear example that supports the view that studies on IS in organisations are difficult to confine to only one level of analysis (Markus and Robey 1988); in our case this difficulty is compounded by the nature of empowerment that affects both individual agents and structure. All the data collected addressed both the individual's interaction with IS and organisational deployment of IS. Finally the analysis based on structuration theory involves precisely how the two levels link with each other and therefore serves for a mixed level analysis. The analysis avoids functionalism and views organisations through the activities of individuals.

Although we do appreciate the need to clarify the unit of analysis that is used in a study to maintain focus and to avoid problems of inference, we believe that a consideration of multiple units of analysis can be beneficial by illuminating different perspectives. As Markus and Robey (1988) note:

> "[b]y consciously mixing levels of analysis, researchers can explore the dynamic interplay among individuals, technology, and larger social structures" (Markus and Robey 1988, p.596).

Hence our research provides an example of a multi-level strategy where the research question, theory, data collection and analysis were all consistently aligned to two levels of analysis. Perhaps the critical point is not the specific level which is chosen for analysis, but rather the need for consistency along all the research stages.

An important advantage in gathering data on multiple levels was the use of both quantitative and qualitative research methods. A second methodological contribution is the combination of quantitative and qualitative methods which was adopted in the research design (see Chapter 3 for extensive discussion). In a recent paper on research methods, Gallivan claims that research that integrates qualitative fieldwork with quantitative methods is scarce in the IS field (Gallivan 1997). An extensive review of 538 papers in four of the most popular IS journals revealed only 1.9% of all papers as mixed methods research. Our research fulfills all the criteria set by Gallivan (1997) and therefore contributes to the extremely limited work in the IS field that

combines qualitative and quantitative research, and to the call for methodological pluralism in IS.

Finally a minor contribution in relation to combining methods is the interpretive analysis of the survey respondents' comments on the questionnaire (see Chapter 4). Such an analysis is very uncommon in IS and we only know of Markus' attempt to interpretively analyse answers to a questionnaire (Markus 1994). Our analysis provides an interesting example of how even the same set of data can provide valuable insights if analysed in multiple ways.

8.2.3 Practical contribution

Empowerment appears to be quite popular at the moment and the signs of competitive pressures, delayering and the other reasons behind its promotion are likely to persist. Our research revealed rich insights and details about all aspects of the adoption of empowerment: its effects on the organisation, the changes it implies for employees' tasks and responsibilities, factors that can mediate its success and ways to assess it. These insights are valuable to the community of managers in manufacturing organisations that are already involved in or are considering empowerment. This contribution is particularly important since the findings refer to the British manufacturing industry which has not been a focus of research in empowerment.

This contribution in its most immediate form, is the feedback of the survey report to the organisations that responded to the survey (see Section 3.3.1) and the dissemination of the research findings to the companies that participated as case studies.

The agency – structure duality is a useful way to approach the organisational changes that the adoption of empowerment necessitates; this was particularly emphasised in the case study reports that were sent to the two companies. This duality lies we believe at the core of the difficulties that organisations face with the encouragement of employee empowerment. For empowerment to work many changes have to take place in the traditional hierarchical

structure and culture of the company to enable and encourage individuals to make decisions and take initiative on their own, but on the other hand even if the organisation is supportive, it is ultimately up to the individual agents (both managers and employees) to be interested, have a positive attitude, take it on board and embrace the change. The diverse attitudes, abilities and frames of mind of employees and managers as well as the complex structural properties of the organisation that constitute this duality suggest why it is often so difficult to make empowerment succeed in contemporary organisations. Managers that are involved in empowerment should bear this duality in mind as it appears to capture an important ingredient for success. The empowerment initiative needs to address the personal interests and motivational requirements of both employees and managers (particularly middle managers who might feel threatened by the change) while at the same time, structural constraints have to be dealt with.

The research also provided interesting insights into the IS support functions for employees and the difficulties that they face, which have practical merit for IS management in manufacturing companies. It highlighted the organisational and technological issues that IS managers have to take into account and address in ensuring adequate IS support for work practices. As our findings suggest, this is likely to be a difficult task and one that they cannot undertake alone, since many constraints are due to the reproduction of particular organisational properties which is supported by line and functional management. Nevertheless a better understanding of these issues can suggest possible solutions to the problems, such as for example, the introduction of a new system from an external systems developer (see Section 7.4.1).

Moreover the analysis of the role of IS in the change of structure provides a better understanding of how IS can be involved in attempts to intentionally transform structural properties. This can be valuable for organisations that are trying to achieve better IS support for empowerment, but also for organisations undergoing various other changes.

Finally we close the assessment of our contribution to practice with a critical ethical concern. Lower level employees are still under difficult working conditions in manufacturing in spite of all the advances in work practices and technological infrastructure. Therefore they deserve - probably more than any other group of workers in industry – continual research into ways that can facilitate their working conditions. Our research was focused from the outset on providing some added value in this dimension. Modern technologies such as IS have the potential to support employees and facilitate their tasks, as others and this research suggests. By addressing the constraining factors that have been identified in this research, employees can benefit from improved IS support.

8.3 Limitations and suggestions for further research

One limitation of this research refers to the theoretical analysis that was carried out, while the remaining limitations concern methodology. Structuration theory highlights the difference between social and system integration. Localised forms of practice can be linked to broader aspects of social systems by examining the ways in which considerations of a more general kind, enter into the situated practices of particular agents. For example, the agents in the manufacturing organisations we studied are part of broader social systems which are likely to be important for their motivations and interests (e.g. the local community, the national organisation and so on). Although we recognise that such an analysis might indeed be useful, it was placed outside the scope of the particular research question and we acknowledge that our analysis fails to accommodate it.

8.3.1 Methodological limitations

Undoubtedly every research approach has its limitations and interpretivism has some too (see Chapter 7). Nevertheless in retrospect the author strongly believes that the research perspective and the particular design were the most suitable for the research questions. Hence we cannot find any limitations to the chosen method but only to the way it was applied.

The first point to note in relation to method is the bias of the survey and our subsequent research towards larger organisations; these could be more traditional and thus more resistant to change. Although smaller organisations might display less reproduction and more transformation and flexibility, we decided to focus on larger ones for the reasons discussed in Chapter 3.

A second limitation of the research design is the relative lack of adequate involvement of lower-level employees in the first two stages of the research. In the survey and series of interviews a very limited number of participants were not managers. This is because it is quite difficult to locate employees from outside the organisation (the survey questionnaire was personally addressed to managers and directors whose names were retrieved from the Personnel Managers' Yearbook, see Chapter 3).

Finally the case studies would have benefited from a longitudinal approach. A longitudinal design would have probably enabled richer insights particularly in the explanation of reproduction or change. However as the case studies were the last part of the empirical research which extended over a period of seventeen months (April 1996 to September 1997), practical limitations made longitudinal study infeasible.

8.3.2 Suggestions for further research

Our work has opened up some interesting issues that merit further exploration. The first of these relates to how the support that IS provide to employees in relation to empowerment and the issues that arise might differ in industries other than manufacturing. For example the principle that employees are provided with as little information as possible is likely not to hold in organisations such as banks or stock brokers, where analysts, traders, etc. are likely to have broad access to information. Furthermore, although our theoretical contribution regarding the understanding of reproduction and transformation is likely to be generalisable beyond manufacturing industry, it would be interesting to see whether any elements of the analysis differ in

other industries, which might be less traditional or perhaps more volatile to change.

A second suggestion concerns the further study of the implementation of an information system as defining a system of relations. The issues of who inputs, who receives, who only reads data and so on, appear promising for the involvement of IS in organisational change. These interactions act as a signal and symbol to organisational members and thus can affect the patterning of social relations. More research into this concept could yield valuable new insights for IS.

A third area which seems interesting and worthy of further research relates to how managers see the transformation of structural properties that constrain empowerment. Contrary to existing work on empowerment which suggests that "superiors want unchallenged power" (Argyris 1998, p.103), our findings suggest that managers' attitudes towards empowerment are more complex. The traditional command-and-control model cannot be regarded as their preferred mode of operation because their responsibilities have changed too. As the external contingencies are changing, managers usually have much more to do and in many situations wish to empower their subordinates. Therefore the paradigm that managers want to hold onto power and resist employee empowerment needs to be qualified. In such a case it will be interesting to research how managers will use the design, development and use of IS to position themselves in relation to employee empowerment.

A fourth promising area is further theoretical work on the application of the organisational change model based on the need for balance between reproduction and transformation. Structuration theory has not yet been applied to the study of organisational change and it seems that it might hold some interesting insights. Maintaining a balance between stability and change appears like a valuable principle but its operationalisation is unclear.

Finally our analysis highlights that there is a need to study the design and development of IS for empowerment (Mumford 1997). Apart from existing

systems, companies are also likely to opt for replacement of their old systems and development of new ones. Many interesting issues arise in this area, like the necessary relationship between the IS department and line employees, the attitudes of IS professionals towards empowerment, the attitudes of employees towards their involvement in systems development and so on. These issues were only briefly mentioned in this research. Nevertheless the insights that have been achieved on the general research topic and the suggestions for further work are a first step towards a better understanding of the role of IS in support of empowerment.

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Dear Sir/Madam,

Research Study on Empowerment and Computer-Based Information Systems

I am currently carrying out a study into the role of computer-based information systems within empowerment strategies in UK manufacturing companies. The study is being financed by the European Commission and is part of a larger research programme within the department.

Over recent years, many manufacturing organizations have introduced major change initiatives such as total quality management and business process re-engineering, which, in many cases, have led to a decentralisation of decision making, such that lower-level staff have gained more responsibility for their work, either individually or through some form of team organization. This increased autonomy or self-management, also known as empowerment, may potentially be important, to human resource directors, industrialists and organizational researchers. My research focuses on the role of computer-based information systems in empowerment. However, this is not a study of the technology itself but rather of the way that staff use such systems in order to support their new responsibilities.

As part of the study, I am carrying out a questionnaire survey of human resource experts from major manufacturers and I would be grateful if you could complete the enclosed questionnaire. Please fill in all relevant sections, regardless of whether your company is a heavy user of IT or has a conscious empowerment programme. Your contribution is valuable to us and the findings of the survey should give you an accurate up-to-date picture of what is happening in your industry.

Please return the completed questionnaire in the enclosed postage-paid envelope by 30 August 1996. If you have any questions please contact me on 0171 955 7464. All information provided will be treated in absolute confidence. In return for your valued help with this survey, you will receive the final report of the aggregated results. Furthermore, you may be interested in the workshop we hope to organize for a more detailed examination of the issues involved.

We greatly appreciate your assistance and thank you in advance for your cooperation. I look forward to hearing from you soon.

Yours sincerely,

Anna Psoinos
EC Research Fellow

A SURVEY OF EMPOWERMENT IN BRITISH MANUFACTURING

Please note:

> *empowerment* = decentralized decision making, autonomy, self-management
>
> *computer-based information systems* = any IT system that is used for work support, information or communication purposes such as logistics, production planning and scheduling systems, electronic mail, team support systems, decision support systems and so on.

Please complete the relevant sections of the white and the pink form according to whether your company has adopted any changes in work organization and the nature of these changes. Please return **both** forms in the enclosed reply-paid envelope.

SECTION 1 : CHANGES IN WORK ORGANIZATION

1. In the last 5 years has your company adopted any major change initiatives aimed at improving the organization of work ?

    Yes ❑   No ❑ If No, please continue on the pink form.

If Yes, please tick the type of change initiative(s) introduced:

Business Process Re-engineering	❑
Total Quality Management	❑
Downsizing	❑
Delayering	❑

Other (please specify)_____

2. What did this initiative(s) involve? (Please tick all that apply)

Restructuring of the organization based on business processes	❑
Reorganization of tasks based on whole, identifiable pieces of work	❑
Set-up of autonomous or semi-autonomous teams	❑
Delegation of managerial decision making responsibilities to lower level staff	❑
Integration of indirect with direct work (e.g. quality control performed by production staff)	❑
Job enlargement	❑
Job rotation	❑

Other (please specify) _____

3. How long ago was the change initiative(s) first introduced? (Please state months/years)

_____

4. Why was the change initiative(s) introduced? (Please indicate all that apply and rank them in descending order, 1= most important reason)

To increase productivity	❑	_____
To improve quality	❑	_____
To improve employee skills	❑	_____
To increase staff commitment to company goals	❑	_____
To make the company more flexible in responding to the market	❑	_____
Due to the introduction of advanced manufacturing technologies	❑	_____
To reduce costs	❑	_____
To improve employee job satisfaction and motivation	❑	_____
To take advantage of new information technologies	❑	_____
To increase worker autonomy	❑	_____
Other (please specify)_____	❑	_____

5. Which parts of your company were the focus of the change initiative(s) and roughly what percentage of staff were directly affected? (Please tick all that apply).

Production function	❑	_____ %
Purchasing department	❑	_____ %
Sales and marketing department	❑	_____ %
Finance department	❑	_____ %
Management function	❑	_____ %
Engineering department	❑	_____ %
Service and maintenance	❑	_____ %

Other (please specify) _____

6. Were layers of management removed as part of the change initiative(s)?

Yes ❑   No ❑

7. Has the initiative(s) resulted in any employee empowerment?

Yes ❑   No ❑ If No, please go to the pink form

Even if your company is at the early stages of empowerment (or has aborted an earlier empowerment initiative) please continue with the relevant parts of this form.

SECTION 2: EMPLOYEE EMPOWERMENT

8. Has empowerment entailed any changes in employee responsibilities? (Please tick all that apply)

No change, they just perform their usual work tasks	❑
They perform equipment maintenance and repair	❑
They have assumed quality responsibilities	❑
They plan and schedule their work	❑
They look for improvements and solve problems	❑
They manage suppliers and external customers directly	❑
They share team leadership responsibilities	❑
They make hiring and firing personnel decisions	❑
They decide on product modification and development	❑

Other (please specify)_____

_____

9. Please give two examples of decisions that were traditionally taken by management that are now delegated to staff .

_____

_____

_____

10. Please indicate how successful the implementation of empowerment has been .

Very unsuccessful					Successful					Very successful	
0	1	2	3	4	5	6	7	8	9	10	

Too soon to tell or data unavailable   ❑

11. Based on your company's experience, in what way do the following factors affect, if at all, the successful introduction and operation of empowerment?

	Facilitates	Constrains	No effect
Training on job content	❑	❑	❑
Training on interpersonal and leadership skills	❑	❑	❑
Trade unions	❑	❑	❑
Status and skills demarcation	❑	❑	❑
Support from middle management	❑	❑	❑
Computer-based information systems	❑	❑	❑
The traditional division of tasks	❑	❑	❑
Decision-making capability of staff	❑	❑	❑
A short work cycle	❑	❑	❑
The high investment in existing production technology	❑	❑	❑
The organizational culture	❑	❑	❑
The hierarchical management structure	❑	❑	❑
A highly automated production system	❑	❑	❑
The complexity and rigidity of the production system	❑	❑	❑
Other (please specify)_____	❑	❑	❑

_____

SECTION 3: INFORMATION SYSTEMS IN EMPOWERMENT

12. Were computer-based information systems a contributing factor in the introduction of empowerment?

Yes ❑   No ❑

If Yes, please comment _____

_____

13. As part of the empowerment initiative have there been any changes in the computer-based information systems in your organization?

No change ❑   Yes, minor changes ❑   Yes, major changes ❑

If Yes, please comment _____

_____

14. Do empowered employees have access to a computer-based information system?

Yes ❑   No ❑   If No, please go to question 17

15. Has there been any change in their access with the introduction of empowerment?

Major reduction	Minor reduction	No change	Minor increase	Major increase
❑	❑	❑	❑	❑

16. What do empowered employees mainly use computer-based information systems for? (Please tick all that apply and rank them in descending order, 1= most important use).

To support work tasks and procedures (e.g.CAD, CAM)	❑	_____
To exchange information on current processes and operations	❑	_____
To facilitate internal and external communication	❑	_____
To access and analyze data	❑	_____
To control production operations	❑	_____
To support decision making	❑	_____
To report their actions and decisions to management	❑	_____
Other (please specify) _____	❑	_____

17. How do empowered employees communicate and receive information? (Please tick all that apply)

The supervisor controls the processes and acts as an information and communication link ☐
By internal memos/documents ☐
Personal face-to-face communication/ meetings ☐
By phone ☐
Through a computer-based information system ☐
Other (please specify) _____

18. Which, if any, of the following factors have negatively affected the use of computer-based information systems (IS) in empowerment? (Please tick all that apply)

IS Technology		Organization		Staff	
inadequate	☐	culture	☐	skills	☐
unfriendly	☐	structure	☐	access to IS	☐
too rigid	☐	strategy	☐	motivation	☐
expensive	☐	Other _____		Other _____	
Other _____					

	Tasks		Information systems department	
	inappropriate	☐	culture	☐
	too complex	☐	structure	☐
	too simple	☐	strategy	☐
	Other _____		Other _____	

Other (please specify) _____

19. Do you believe that either now or in the future, computer-based information systems can support empowerment in your organization?

No ☐   Yes, minor support ☐   Yes, major support ☐

20. What steps could be taken, in your view, to enhance the support that computer-based information systems provide for empowerment?

_____
_____

COMPANY BACKGROUND INFORMATION
We would be grateful for the following information which will remain strictly confidential.
Name: _____   Position: _____
Company name:_____   Company address:_____

Telephone No. :_____   Fax No:_____
Number of employees: _____   Industry sector: _____
Annual turnover: _____   Main product lines:_____

Would you be willing to discuss your experience with empowerment with a researcher?
Yes ☐   No ☐
Would you be interested in attending a workshop to examine the issues addressed above in more detail?
Yes ☐   No ☐

Thank you very much for taking the time to complete this questionnaire

*If your company has not introduced any major change initiative please **only** fill in Section 1, and if it has,but it has not resulted in empowerment please **only** complete Section 2.*

SECTION 1

1.Is your company considering any changes in work organization?

          Yes   ❑   No   ❑   If No, please go to question 4.

2. Would they involve any of the following? (Please tick all that apply)

Restructuring of the organization based on business processes   ❑
Reorganization of tasks based on whole, identifiable pieces of work   ❑
Set-up of autonomous or semi-autonomous teams   ❑
Delegation of managerial decision making responsibilities to lower level staff   ❑
Integration of indirect with direct work (e.g. quality control performed by production staff)   ❑
Job enlargement   ❑
Job rotation   ❑
Other (please specify) _____

3. Would this change aim to result in increased employee empowerment?

          Yes   ❑   No   ❑   Don't know   ❑

Please go to COMPANY BACKGROUND INFORMATION

4. Why is your company not considering any changes in work organization? (Please tick all that apply)

No need for change   ❑
Short-term financial pressures prohibit such change initiatives   ❑
We don't believe in the value of such change initiatives   ❑
Other (please specify) _____

COMPANY BACKGROUND INFORMATION

We would be grateful for the following information which will remain strictly confidential.

Name: _____   Position: _____
Company name:_____   Company address:_____

Telephone No. :_____   Fax No:_____

Number of employees: _____   Industry sector:_____
Annual turnover: _____   Main product lines:_____

Would you be interested in attending a workshop to examine the issues addressed above in more detail?

          Yes   ❑   No   ❑

Thank you very much for taking the time to complete this questionnaire

SECTION 2

5. Why did the change initiative(s) not result in employee empowerment ? (Please tick all that apply)

The company is already sufficiently decentralized and staff have a high degree of autonomy ❏

We don't believe that empowerment is desirable ❏

We wanted to increase empowerment but the initiative did not succeed in that ❏

Other(please specify) _____

_____

6. What would you say are the major constraints in the introduction and operation of empowerment?
(Please tick all that apply and rank them in descending order, 1= most important constraint)

The organizational culture	❏	_____
The hierarchical management structure	❏	_____
Trade unions	❏	_____
Status and skills demarcation	❏	_____
Inappropriate computer-based information systems	❏	_____
Inadequate resources	❏	_____
The subsequent benefits take a long time to materialize	❏	_____
The traditional division of tasks	❏	_____
Decision-making capability of staff	❏	_____
A short work cycle	❏	_____
The high investment in existing production technology	❏	_____
A highly automated production system	❏	_____
The complexity and rigidity of the production system	❏	_____
Other (please specify)_____	❏	_____

_____

COMPANY BACKGROUND INFORMATION

We would be grateful for the following information which will remain strictly confidential.

Name: _____   Position: _____

Company name:_____   Company address:_____

_____

Telephone No. :_____   Fax No:_____

Number of employees: _____   Industry sector: _____

Annual turnover: _____   Main product lines:_____

_____

Would you be interested in attending a workshop to examine the issues addressed above in more detail?

Yes ❏   No ❏

Thank you very much for taking the time to complete this questionnaire

A SURVEY OF EMPOWERMENT IN BRITISH MANUFACTURING

Please note:

> *empowerment* = decentralized decision making, autonomy, self-management
>
> *computer-based information systems* = any IT system that is used for work support, information or communication purposes such as logistics, production planning and scheduling systems, electronic mail, team support systems, decision support systems and so on.

Please complete the relevant sections of the white and the pink form according to whether your company has adopted any changes in work organization and the nature of these changes. Please return the forms in the enclosed reply-paid envelope.

SECTION 1 : CHANGES IN WORK ORGANIZATION

1. In the last 5 years or so, has your company adopted any major change initiatives aimed at improving the organization of work ?

Yes ❑   No ❑ If No, please continue on the pink form.

If Yes, please tick the type of change initiative(s) introduced:

Business Process Re-engineering   ❑
Total Quality Management   ❑
Downsizing   ❑
Delayering   ❑
Other (please specify)_____

2. What did this initiative(s) involve? (Please tick all that apply)

Restructuring of the organization based on business processes   ❑
Reorganization of tasks based on whole, identifiable pieces of work   ❑
Set-up of autonomous or semi-autonomous teams   ❑
Delegation of managerial decision making responsibilities to lower level staff   ❑
Integration of indirect with direct work (e.g. quality control performed by production staff)   ❑
Job enlargement   ❑
Job rotation   ❑
Other (please specify) _____

3. How long ago was the change initiative(s) first introduced? (Please state months/years)

_____

4. Why was the change initiative(s) introduced? (Please indicate all that apply and rank them in descending order, 1= most important reason)

To increase productivity   ❑   _____
To improve quality   ❑   _____
To improve employee skills   ❑   _____
To increase staff commitment to company goals   ❑   _____
To make the company more flexible in responding to the market   ❑   _____
Due to the introduction of advanced manufacturing technologies   ❑   _____
To reduce costs   ❑   _____
To improve employee job satisfaction and motivation   ❑   _____
To take advantage of new information technologies   ❑   _____
To increase worker autonomy   ❑   _____
Other (please specify)_____   ❑   _____

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5. Were layers of management removed as part of the change initiative(s)?

Yes ☐   No ☐

6. Has the initiative(s) resulted in any employee empowerment?

Yes ☐   No ☐ If No, please go to the pink form

Even if your company is at the early stages of empowerment (or has aborted an earlier empowerment initiative) please continue with the relevant parts of this form.

SECTION 2: EMPLOYEE EMPOWERMENT

7. Which department, group or individual was mostly responsible for the introduction of empowerment? (Please tick all that apply)

CEO ☐
Senior management ☐
Middle management ☐
Personnel department ☐
Lower level staff ☐
Other (please specify) _____

8. Has empowerment entailed any changes in employee responsibilities? (Please tick all that apply)

No change, they just perform their usual work tasks ☐
They perform equipment maintenance and repair ☐
They have assumed quality responsibilities ☐
They plan and schedule their work ☐
They look for improvements and solve problems ☐
They manage suppliers and external customers directly ☐
They share team leadership responsibilities ☐
They make hiring and firing personnel decisions ☐
They decide on product modification and development ☐
Other (please specify)_____

9. Please give two examples of decisions that were traditionally taken by management that are now delegated to staff.

_____

_____

10. Which elements of your organization have been most affected by empowerment? (Please tick all that apply)

Structure ☐
Tasks and procedures ☐
People (skills, job satisfaction, etc.) ☐
Culture (values, behaviour, relationships, etc.) ☐
Other (please specify) _____

11. Please indicate how successful the implementation of empowerment has been.

Very unsuccessful					Successful					Very successful
0	1	2	3	4	5	6	7	8	9	10

Too soon to tell or data unavailable ☐

12. Based on your company's experience, which factors influenced the successful outcome of empowerment?

	Facilitated	Constrained	No effect
The organizational culture	❑	❑	❑
The hierarchical management structure	❑	❑	❑
Employee skills	❑	❑	❑
Trade unions	❑	❑	❑
Status and skills demarcation	❑	❑	❑
Middle management	❑	❑	❑
Computer-based information systems	❑	❑	❑
The traditional division of tasks	❑	❑	❑
Decision-making capability of staff	❑	❑	❑
A short work cycle	❑	❑	❑
The high investment in existing production technology	❑	❑	❑
A highly automated production system	❑	❑	❑
The complexity and rigidity of the production system	❑	❑	❑
Other (please specify)_____	❑	❑	❑

SECTION 3: INFORMATION SYSTEMS IN EMPOWERMENT

13. What do empowered employees mainly use computer-based information systems for? (Please tick all that apply and rank them in descending order, 1= most important use).

To support work tasks and procedures (e.g. CAD, CAM)	❑	_____
To exchange information on current processes and operations	❑	_____
To facilitate internal and external communication	❑	_____
To access and analyze data	❑	_____
To control production operations	❑	_____
To support decision making	❑	_____
To report their actions and decisions to management	❑	_____
Other (please specify) _____	❑	_____

14. Which, if any, of the following factors have **negatively** affected the use of computer-based information systems (IS) in empowerment? (Please tick all that apply)

IS Technology		Organization		Staff	
inadequate	❑	culture	❑	IS skills	❑
unfriendly	❑	structure	❑	access to IS	❑
too rigid	❑	strategy	❑	motivation	❑
expensive	❑	Other _____		Other _____	
Other _____					

	Tasks		Information systems department	
	inappropriate	❑	culture	❑
	too complex	❑	structure	❑
	too simple	❑	strategy	❑
	Other _____		Other _____	

Other (please specify) _____

15. Do you believe that computer-based information systems can support empowerment in your organization?

No ❏   Yes, minor support ❏   Yes, major support ❏

Please comment _____

16. Which aspect of empowerment can computer-based information systems have a major impact on?

_____

17. Has empowerment entailed any changes in the computer-based information systems and their use in your organization?

No ❏   Please go to Question 20   Yes ❏

18. What did these changes involve? (Please tick all that apply)

Structure of the existing information systems   ❏
Information content of the existing systems   ❏
Access that employees have to the existing systems   ❏
Uses that employees make of the systems in relation to their tasks   ❏
Additional training for the use of existing systems   ❏
Introduction of new systems or new capabilities   ❏
IS design, development and management procedures   ❏
Other (please specify) _____

Please comment _____

19. Who initiated these changes and how were they introduced ?

_____

_____

20. What steps could be taken, in your view, to enhance the support that computer-based information systems provide for empowerment?

_____

_____

_____

COMPANY BACKGROUND INFORMATION

We would be grateful for the following information which will remain strictly confidential.
Name: _____   Position: _____
Company name:_____   Company address:_____

Telephone No. :_____   Fax No:_____
Number of employees: _____   Industry sector: _____

Would you be willing to discuss your answers to this questionnaire with us?
Yes ❏   No ❏

Would you be interested in attending a workshop to examine the issues addressed above in more detail?
Yes ❏   No ❏

Thank you very much for taking the time to complete this questionnaire

*If your company has not introduced any major change initiative please **only** fill in Section 1, and if it has, but it has not resulted in empowerment please **only** complete Section 2.*

SECTION 1

1. Is your company considering any changes in work organization?

           Yes ❑   No ❑   If No, please go to COMPANY INFORMATION

2. Would they involve any of the following? (Please tick all that apply)

Restructuring of the organization based on business processes   ❑
Reorganization of tasks based on whole, identifiable pieces of work   ❑
Set-up of autonomous or semi-autonomous teams   ❑
Delegation of managerial decision making responsibilities to lower level staff   ❑
Integration of indirect with direct work (e.g. quality control performed by production staff)   ❑
Job enlargement   ❑
Job rotation   ❑
Other (please specify) _____

3. Would this change aim to result in increased employee empowerment?

                Yes ❑   No ❑   Don't know ❑

Please go to COMPANY BACKGROUND INFORMATION at the end of this form

SECTION 2

4. Why did the change initiative(s) not result in employee empowerment ? (Please tick all that apply)

The company is already sufficiently decentralized and staff have a high degree of autonomy   ❑
We don't believe that empowerment is desirable   ❑
We wanted to increase empowerment but the initiative did not succeed in that   ❑
Other(please specify) _____

5. What would you say are the major constraints in the introduction and operation of empowerment? (Please tick all that apply and rank them in descending order, 1= most important constraint)

The organizational culture   ❑   _____
The hierarchical management structure   ❑   _____
Trade unions   ❑   _____
Inadequate resources   ❑   _____
Short term financial pressures   ❑   _____
The traditional division of tasks   ❑   _____
Employee skills and decision-making capabilities   ❑   _____
Other (please specify)_____   ❑   _____

COMPANY BACKGROUND INFORMATION

We would be grateful for the following information which will remain strictly confidential.

Name: _____   Position: _____
Company name:_____   Company address:_____

Number of employees: _____ Industry sector: _____

Would you like to receive a copy of the final report of the survey results?

              Yes ❑   No ❑

Thank you very much for taking the time to complete this questionnaire

13 September 1996

Dear ,

Research Study on Empowerment and Computer-Based Information Systems

At the end of last July, I wrote to you requesting your participation in a survey that explores the role of information systems within empowerment strategies in UK manufacturing companies. This research project is funded by the European Commission and will be extended to study the same issue in other EU countries.

Since we have not received your reply yet, I would like to stress that the survey was personally addressed to a small, but representative sample of experts from the top 500 UK manufacturers. Up to now, the responses we have received are revealing a particularly interesting situation which your own experience can further support or refute. Therefore, your contribution is extremely important in ensuring that the results of the survey are both meaningful and statistically strong.

If you have already completed and returned the questionnaire to us, please accept our sincere thanks. If by some chance you did not receive it, or it was misplaced, please contact me on 0171 955 7464 (or by fax on 0171 955 7385) and I will send you another copy immediately.

Enclosed please find a response sheet that can be used to facilitate our communication. In case of any problems in returning the questionnaire to us, you are kindly requested to either post or fax this note.

We thank you for your cooperation and look forward to hearing from you soon.

Yours sincerely,

Anna Psoinos
EC Research Fellow

Response Sheet

(Please tick the appropriate answer)

Please send me a second copy of the questionnaire   [   ]

Yes, I have completed the questionnaire and returned it to you   [   ]

No, I have not completed the questionnaire because we do not have   [   ]
any manufacturing activities in the UK

No, I have not completed the questionnaire as we are not involved   [   ]
in empowerment in any way

No, I have not completed the questionnaire due to company policy,   [   ]
unavailabitity of time, resources, etc.

Name: ....

Position: ....

Company: ....

Address: ....

                ....

                ....

Tel: ....

Please post or fax to: Anna Psoinos
                            Department of Information Systems
                            London School of Economics
                            Houghton Street
                            London WC2A 2AE
Fax: 0171 955 7385

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26 September 1996

Dear Mr,

Research Study on Empowerment and Computer-Based Information Systems

Thank you very much for returning the questionnaire concerning the above study last August. I apologize for the delay in acknowledging receipt but we have been receiving replies until very recently. Your questionnaire was one of the best completed and your answers show a good understanding of the issues arising due to empowerment.

At this stage we are performing the questionnaire analysis and our initial results are revealing a particularly interesting situation. We will explore this situation further by discussions with the respondents.

As you noted in your reply that you would be willing to discuss your answers, we will shortly be getting in touch with you to arrange a possible meeting.

Your cooperation is greatly appreciated and I am sure that you will find the results of the survey quite valuable.

Yours sincerely,

Anna Psoinos

INTERVIEW AGENDA

General Overview & History of the Change Initiatives and Empowerment

1. You mentioned in your answers that your company has been involved in change initiatives that resulted in empowerment. Could you talk me through the introduction of empowerment? How did it happen? Who were the people involved and so on?

2. What was different or special would you say in the way empowerment occurred in your organization?

3. Was empowerment a deliberate choice or rather did it just happen as an unintentional result of TQM, BPR or whatever else you did? Do you view it as part of the change initiative or rather as a result of it?

4. When you say empowerment in your organization what do you mean by the term? What does empowerment entail in your organization?

5. You ticked these boxes in Question 1. Were they separate CI?

- Do they cover all levels and sections of the organization?

- Which ones affect particularly lower-level employees?

- How are these changes integrated? If they were not all introduced at the same time was there any effort to bind them together?

- Would you see empowerment as a result or ingredient of all of them at the same time, or rather of one in particular?

6. Would you say that your company is one where organizational and structural change are a way of life? (attitude to change)

7. Where does the championship of empowerment come from? (Clarify question 7)

8. Regarding Question 10 which attempts to identify the effects of empowerment on the main organizational elements. Would you say that these are affected by empowerment or rather by the broader CI?

9. What exactly are the changes that empowerment has brought about in structure, culture, tasks & people?

10. How are the employees coping with their new responsibilities?

11. Why do you **rate the success of empowerment** as (high, low)? What sort of **measures-indicators** do you take into account?

12. Why do you feel that (these factors) acted as **constraints** in the success of empowerment?

13. What would you say are the **factors that determine empowerment success?**

14. What would you say are the **most characteristic changes** due to empowerment on an organizational and on an individual employee level?

15. Have these **created new or enhanced already existing** IS support needs? E.g. you noted that rank and file employees need to have access to key decision making data. Was this need created by empowerment?

16. Were these needs met and how?

IS in empowerment

1. What kind of IS do you currently have in place in your organization?

2. To which of these systems have blue-collar workers access to and for what purpose?

3. Could you please give examples of the uses that employees make of IS?

4. How did you experience the effect of organizational culture and IS department strategy as negative factors in the use of IS in empowerment? How exactly did these factors act?

5. What kind of difficulties did your organization experience in your use of IS in support of empowerment? Eg you noted that IS can support empowerment through the delivery of information to the right place at the right time etc. Is that happening to a satisfactory extent?

6. Did these lead to changes in your IS? If not, how did you come to decide that changes were necessary?

7.Could you describe the changes you did to your IS in more detail (Qu 18)?

Are there any issues we missed that you wish to bring up?

Is there any documentation maybe available that you think might be helpful?

LIST OF INTERVIEWS CONDUCTED

Name	Job Title	Company	Date
Peter Brand	Human Resources Manager	Amersham International Plc., Amersham	2/12/1996
Dr F.G. Evans	Training and Dev. Manager	Blue Circle Cement, Reading	6/12/1996
Heather Melville	Compensation & Benefits Manager	Kraft Jacobs Suchard Ltd., Cheltenham	11/12/1996
Colin Court	Human Resources Dev. Manager	Rank Xerox Ltd., Gloucest.	11/12/1996
Peter Ward	Personnel Manager	Caradon MK Electric Ltd., Edmonton	12/12/1996
Sarah Lawton	Personnel Officer	Ford Motor Co. Ltd, Dagenham	16/12/1996
Nigel Minton	Head of Personnel Quality & Systems	Rolls-Royce Plc.-Aerospace Group, LSE	20/12/1996
Anthony Lines	Personnel Manager	Vauxhall Motors Ltd., Luton	15/1/1997
Stewart Pierce	Personnel Director	Leyland Trucks Ltd., Preston	16/1/1997
Ray Flynn	Systems Manager	Leyland Trucks Ltd., Preston	16/1/1997
Hugh Stirk	Deputy UK National Manager	Unilever UK Ltd., London	17/1/1997
John MacDonough	Personnel Manager	Vauxhall Motors Ltd., Ellesmere Port	20/1/1997
Paul Holt	Personnel Director	BICC Cables Ltd., Chester	20/1/1997
Alan Harrison	Information Systems Director	BICC Cables Ltd., Chester	20/1/1997
Nigel Toon	HR Manager - Resourcing	Walkers Snack Foods Ltd., Reading	24/1/1997
Donna Humphries	Team Leader - Personnel Administration & IT	Rolls-Royce Motor Cars Ltd., Crewe	28/1/1997 (phone)
J.D.G. Stanton	IT Strategy Manager	Rover Group Ltd., Warwick	30/1/1997
Paul Smart	Information Technology Manager	Parker Hanniffin Corp., Hemel Hempstead	3/2/1997
Anne Downey	Human Resources Site Manager	Esso Ltd., Surrey	4/2/1997
Steve J. Holt	Head of UK Manufacturing IT	Glaxo Wellcome Operations, Ware	5/2/1997

According to a survey reported in Computing magazine, the following interview participants are in the Top 100 IT users in the UK:

Ranking in Top 100 IT users list	Company	Turnover (£m)	IT staff	Indicative IT spend (£m)
11	Rolls-Royce Aerospace	3,597	1,149	186
20	Glaxo Wellcome	8,341	1,095	117
50	Unilever	9,123	498	55
62	Esso UK	8,241	364	40
69	Ford Motor Co.	6,400	527	35

Table 1: Ranking of six interview participants in the Top 100 IT Users in the UK (source: Computing/Spikes Cavell 1997)

Vauxhall Motors, another company that participated in our interviews, requested not to be included in the list although they fall within the Top 100 IT users.

INTERVIEW AGENDA

1. From my discussions so far it appears that BICC has been involved in various changes in the organization of work that resulted in some empowerment. Could we talk about this idea of empowerment? How it came about? What does it involve?

2. What does employee empowerment mean in BICC?

3. Has empowerment had any implications for the structure, culture, tasks and procedures and the people of the organization?

4. Where there any constraints/difficulties at the beginning? How about now? Are they the same?

5. Has empowerment changed your relationship with your subordinates?

6. Has empowerment entailed any new or different responsibilities for employees? What are these?

7. Have these responsibilities created new or enhanced already existing IS support needs?

8. Are these needs met and how?

9. What kind of IS do you currently have in place on site?

10. Do IS have a role to play in support of empowerment in BICC (e.g. tool for communication, innovation, control)?

11. Could you please give examples of the uses that employees make of IS in relation to responsibilities brought about by empowerment?

12. Could you describe the structure of your IS organization? How do you think this is working?

13. What is your view on the need for an integrated pan-european IS? Do you think that it compromises the idea of decentralization?

14. Would you say that there are any constraints in the effective use of IS by empowered employees?

15. What could be done to overcome them?

16. Does the use of IS in your organization contribute in any way in demonstrating to an individual how his work fits in with the tasks of his fellow employees and in the entire business process? (E.g. computer-generated charts showing performance, etc.)

Are there any issues we missed that you wish to bring up?

Is there any documentation maybe available, like organizational charts that you think might be helpful?

Do you think it might be possible for me to talk to a couple of the staff here at ...?

INTERVIEW AGENDA

1. From my discussions so far it appears that Blue Circle has been involved in various changes in the organization of work that resulted in some empowerment. Could we talk about this idea of empowerment? How it came about? What does it involve?

2. What does employee empowerment mean in Blue Circle?

3. Has empowerment had any implications for the structure, culture, tasks and procedures and the people of the organization?

4. Where there any constraints/difficulties at the beginning? How about now? Are they the same?

5. Has empowerment changed your relationship with your subordinates?

6. Has empowerment entailed any new or different responsibilities for employees? What are these?

7. Have these responsibilities created new or enhanced already existing IS support needs?

8. Are these needs met and how?

9. What kind of IS do you currently have in place on site?

10. Do IS have a role to play in support of empowerment in Blue Circle (e.g. tool for communication, innovation, control)?

11. Could you please give me some examples of the uses that employees make of IS in relation to responsibilities brought about by empowerment?

12.Could you describe the structure of your IS organization? How do you think this is working?

13.Would you say that there are any constraints in the effective use of IS by empowered employees?

14.What could be done to overcome them?

15.Does the use of IS in your organization contribute in any way in demonstrating to an individual how his work fits in with the tasks of his fellow employees and in the entire business process? (E.g. computer-generated charts showing performance,etc.)

16.Is there any element in your IS that helps the individual relate his/her work to the customer?

Are there any issues we missed that you wish to bring up?

Is there any documentation maybe available, like organizational charts that you think might be helpful?

Do you think it might be possible for me to talk to a couple of the staff here at ...?

Additional questions for later interviews

- From my discussions in Blue Circle Cement it appears that the company has been involved in various changes in the organisation of work that resulted in employee empowerment. What does this idea involve? What does it mean for Blue Circle?
- Do you think that information systems have a role to play in support of empowerment in Blue Circle? What would that be? (e.g. tool for communication, innovation, control)

- Do you agree with the idea that the introduction of information systems to support work tasks can result in a rigid and mechanistic way of carrying out a process, thus inhibiting thinking?

- How do you see the role of IT? As providing users with tools or complete solutions? Do you see any implications for design and development?

- Flexibility versus standardization and integration?

- Would you agree that for an employee to be able to make decisions, he needs cross-functional information systems?

- Are there any difficulties in the effective use of information systems in support of empowerment ? (e.g. limitations to access, lack of integration of systems, information systems used as a control mechanism, lack of skills)

- What could be done to overcome these problems?

- How to you see the principle of "need to know" as opposed to "need not to know" for issues of access?

- What is the attitude of the BCC IT people towards users? How do they see their role?

- What would be the most suitable structure of the IT department to support the operation of empowerment?

- Empowerment creates a new working practice that necessitates new systems. However, in many cases users require the IT department to support what they are doing at the moment as opposed to the way they'll need to do the job in the future. Is this a problem that you find in Blue Circle? Do users feel that they can't change their working practices until they have the systems to support them?

Case analysis

Coding

Codes are "the tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study" (Miles and Huberman 1994, p.56). However, even during the coding of the first interview, it became evident that apart from the instances where the answer of the interviewee was clearly linked to an issue, in many other pieces of information the analyst is assigning meaning, based on his or her subjective beliefs for what data mean. As Miles and Huberman (1994) very vividly explain with a metaphor a word or phrase does not "contain" its meaning as a bucket "contains" water, but has the meaning it does because the analyst makes a choice about its significance in a given context. That choice, we believe is the essence of intepretivism as other analysts could most certainly make a different choice to "stand for" that word or phrase. This choice is guided by the conceptual framework and the research questions at hand and although these are valuable we took particular care not to impose them on the data. An example of how this was attempted can be seen in one category which was coded as PROB-IT: problems that users experience with the use of IT. Some of these issues can inferentially suggest constraints in the use of IS in relation to empowerment. We decided to code them as PROB-IT and later on, if clear linkage was put forward by other interviewees to consider them as possible constraints in the analysis.

Similarly although Miles and Huberman suggest that their preferred method of code creation is that of creating a provisional "start list" of codes prior to fieldwork which is then revised as data comes in, we thought it best to follow a more inductive approach. We agree with (Smith 1990) who notes that the usefulness of explicit coding during data collection is limited. No precoding took place until all the data were collected. This is in accordance with the "grounded" approach originally advocated by Glazer and Strauss (1967) and has the advantage that it allows the analyst to be more context-sensitive and

less constrained by the prefabricated start list. All the interviews were transcribed in detail and were then reviewed line by line, typically within every paragraph. Beside the paragraph categories or labels were generated and a list of them grew . The labels were reviewed and frequently a slightly more abstract category was created to encompass several events or observations (Miles and Huberman 1994). In this way a list of codes was compiled, making sure that it has a structure so that codes relate to or are distinct from others in meaningful and important ways. The list was revised as broader code categories emerged.

Coding was done at the end of data collection and it was performed at two stages. Firstly, descriptive codes were assigned and pattern codes - explanatory or inferential codes that identify an emergent theme, cause or explanation - were assigned as the analysis was progressing. As with coding, we felt that pattern coding could only be meaningful after considerable familiarity with the data had arisen. We thought it best to be more inductive and waited until enough data accumulate to support a construct unequivocally. We felt that this was the best way to go because a hasty pattern code generation holds the danger of "getting locked too quickly into naming a pattern [...] and then thrusting the name onto data that fit it only poorly. Premature analytic closure is hard to shake, in part, because the analyst often is not aware of what is happening, or the new data collected to verify the pattern are being sought out selectively (Miles and Huberman 1994, p.69-70). Marginal remarks were also made in the margin of the text, and represent ideas and reactions to what was being read during coding. These ideas suggest new interpretations and connections to other parts of the data and add meaning and clarity to field notes.

Memos

Numerous memos were also written up as data collection was progressing. A memo is "the theorizing write-up of ideas about codes and their relationships as they strike the strike the analyst while coding ... it exhausts the analyst's momentary ideation based on data with perhaps a little conceptual elaboration" (Miles and Huberman 1994). Memos report ideas that stem from

the data collected and tie together different pieces into a more general concept. Memos can go well beyond codes and their relationships to any aspect of the research, and we found them particularly useful during data collection as the only step away from the immediate toward the more general. They were spontaneous and we dated and entitled them with the key concepts being discussed; dating them allowed us to trace the evolution of ideas and hypotheses during the core of the analysis.

Data display

A display according to Miles and Huberman (1994) is "a visual format that presents information systematically, so that the user can draw valid conclusions and take needed action" (p.91). Since extended text which in most cases is the most common form of display is difficult to handle effectively, various types of data displays were developed and used throughout data analysis. These were mostly matrices but not in the srict form of checklist matrices that Miles and Huberman describe. These helped to shed light on **what** is going on and **how** things are proceeding and later, as more comprehensive descriptions were formed, to explain and provide plausible reasons for **why** things are happening as they are. Practically these should be focused enough to permit a viewing of the condensed, distilled data set in the same location and should be arranged systematically to facilitate comparisons, detection of similarities and differences, patterns, themes and so on.

Conclusion drawing and verification

Even from the outset of data collection there is an element of what the conclusions of the research can be, based on the conceptual framework and the theoretical propositions that stem from the theory. However, as the research tries hard not to impose our view of empowerment and of the role of IS on the people that were interviewed, we stayed away from conclusion drawing until the data analysis was over.

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