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**INFORMATION SYSTEMS
AND ORGANISATIONAL CHANGE**

PLAN

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ABSTRACT

Organisations may be viewed as shifting political coalitions competing for organisational resources. Control over the administration and distribution of information is one means for influencing the distribution of intraorganisational power. The history of Management Information Systems implementation in organisations points to the fact that implementation is not a simple nor a straightforward process. It is very much based on humans beliefs, emotions, perceptions and the like. Cases have been recorded which refer to sophisticated technical systems failing because of actions taken by the people required to operate these systems. The management of any organisation has to realise this situation very early in the development cycle and not when the problems start to occur. This paper discusses long-term change in organisations in relation to Information Systems. It explores the nature of implementation -how people react to change and why- as well as how the reactions are often manifested in terms of counter-implementation.

1. INTRODUCTION

The information revolution is sweeping through our economy. No company can escape its affects. Dramatic reduction in the cost of obtaining, processing and transmitting information are changing the way we do business. Most Chief Executive Officers (CEOs) know that the revolution is under way, and few dispute its importance. As more and more of their time and capital budgeted is absorbed in information technology and its effects. CEOs acquire a growing awareness that the technology can no longer be the exclusive territory of the departments of EDP or Informatics. As they see their rivals using information for competitive advantage, these executives recognise the need to become directly involved in the management of the new technology. In the face of rapid change, however, they do not know how.

From the beginning we have to refer that information technology is more than just computers (Long 1988). Today information technology must be conceived broadly to encompass the information that business creates and uses as well as a wide spectrum of increasingly convergent and linked technologies that process the information. In addition to computers, then, data recognition equipment, communications technologies, factory automation, and other hardware and services are involved.

Understanding the impact of IS on management and organisation is an important area of investigation attracting the attention of social scientists, public policy makers and business managers. While most other areas of management knowledge have been very critically re-examined, the question of IS impact has led a charmed existence. Despite the billions of drachmas we spend on information systems, we have little systematic information

about how these systems actually "work" in organisations.

The decision to introduce, and use IS in an organisation has managerial implications that go far beyond and mere acquisition of a piece of technical equipment. Information vital to the support of planning and control decisions is affected by the IS that develops; the entire organisational structure may undergo stress and alterations; the nature and number of jobs is affected; the economic consequences are often hard to predict; and the decision-making techniques that have been used by managers in the past may have to be changed.

The implementation of new technology sometimes encounters setbacks. People do not agree with the change, or they fight against new ideas. There are important reasons why resistance may occur. Managers need to understand these reasons in order to overcome resistance to change. Examples of resistance to change in operating methods are encountered at various stages in man's history. When IS were introduced in organisations, resistance again occurred. The business literature abounds with examples of the actions of employees resisting the introduction of new systems (Franz and Robey 1984, Gluff 1979, Megarry 1984, Reynolds 1988, Senn 1987).

Among recent developments is the increased awareness of the political importance of IS (Bariff and Galbraith 1978, Keen 1984, Marcus 1983). Earlier studies assumed that rational managerial interests guided IS design and that system success could be measured in terms of improvement in decision making. Recent work questions these "rationalist" assumptions and examines the political motives behind system development (Bjorn-Andersen 1984, Bjorn-Andersen and Petersen 1980, Keen 1984, Marcus and Bjorn-Andersen 1987, Pettigrew 1980).

Rationalist perspectives tend to focus on changes in formal structure, interpreting them as appropriate moves toward greater efficiency in resource utilisation. Studies using a political interpretation of MIS introduction, often report that computing produces no

change and favors the status quo (Long 1988, Marcus 1983). The protection or strengthening of existing power bases is frequently offered to explain findings of no change.

From the above it is obvious that the implementation of IS has multiple effects. It therefore seems prudent to confine a study of impacts to one or a few areas that appear to be of critical importance. The exercise of power or control in organisations undoubtedly qualifies as an important area of such studies.

The development of this paper has started with the examination of why information is necessary in an organisation, continuing with the reasons for IS failure and the affects of IS on the organisation. Additionally the politics of data is examined in a separate section, because of its importance in the organisational change.

2. INFORMATION AS A VALUABLE RESOURCE

Organisations may be characterised as a set of purposeful systems which select and modify objectives and the means of their attainment. Most organisations and their members operate within infrastructures and environments exhibiting varying degrees of uncertainty. Thus, the choice of objectives and the performance of tasks require information processing activities which obtain additional information necessary for the planning and execution of tasks.

The sources of this information may reside within the firm or external of the firm. Internal environment involves information about the state of the company, its strengths, weaknesses and all operating characteristics. The external environment involves in-

formation about the type of environment within which the organisation is operating.

Furthermore, transmission of the information may occur through formal communication channels or informal channels (Davis and Olson 1985). Thus, there are two types of management information, these being formal and informal. Formal information is the information that is committed to be recorded or it is a part of a formal system of the organisation, e.g. balance sheets, accounts, computer files, production schedules e.t.c.

Informal information is the information that is not part of any formal system of the organisation (Carter 1986). It can be committed to "record" or can be to an individual's brain and usually it is available to a limited number of individuals and not the organisation as a whole, e.g. the internal political situation, the "black books" made by the people just in case!

Information systems are designed to facilitate these types and modes of communication. One intriguing aspect, however, is the redistribution of power caused by the choice of information mechanism, e.g. a change from a human to a computer-based reporting system with automatic source data entry (Keen 1984).

Information is contained in many forms and is generally recognised as a valuable resource (Keen 1984). Although many measures of information value have been proposed (e.g. changes in expected value of information, decreased decision time, e.t.c.) information is not formally recognised and recorded as an asset within an organisation's financial reports. Surrogate measures of information value are represented by an organisation's investment in database administrators, database management systems and data security mechanisms.

The information resource, however, is necessary for the performance of daily activities. Moreover, the complexity and uncertainty of organisational environments require intelligence information for shaping the environment of adapting to uncontrollable events.

3. A SYSTEM VIEW OF MIS IMPLEMENTATION

If a systems theory perspective of organisations is adopted, then the information systems can be viewed as one of several organisational subsystems. Any change in the MIS can be expected to have repercussions of the operations of other organisational subsystems (Whisler 1970). Usually, system builders are using methods such as structured system analysis, which allow them to describe and analyse only the technical features of a setting which is to be automated. To design systems that will not be resisted or to devise ways to modify resisted systems, this technical system analysis must be augmented with a social or political analysis (Marcus 1983).

It has long been recognised by system designers and implementors that introduction of IS into organisations involves more than mere technological change. Since the early 1960's, IS specialists have been concerned with the behavioral aspects of using computers, partially with the issue of user resistance. To include the social aspect in the technological change process, MIS designers have advocated careful MIS planning and participation of users in the design and implementation process.

Incorporating behavioral aspects into systems implementation, however, has been largely a "seat of pants" approach, more an art than a science. And even where users are involved to some extent in initial development of a new system, they are rarely consulted when systems are changed or modified. Overconcentration on the technical aspects of systems and the tendency to overlook behavioral problems continue to result in information systems failure (DeSanctis and Courtney 1983). Thus, although systems specialists have made some attempts to consider the role of human related elements in system functioning, the inability of technically sound information systems to meet their original objectives can

be attributed to inadequate treatment of the human dimension of the organisation.

4. REASONS FOR INFORMATION SYSTEMS FAILURE

In this section we will examine the reasons for IS failure. These reasons are basically the causes of counterimplementation in information systems development.

4.1. Concentration on the technical aspects of the system

Open systems theory views an organisation as a set of interrelated components that interact with each other and with an organisation's environment. This perspective, as espoused by organisation theorists, conceives of four major variables within an organisation: People, Technology, Tasks and Structure. These four elements are highly interdependent, so that change in any one will result either directly or indirectly, in change in others. The fact that computer technology affects all subsystems of the firm - social, structural and technical- has been observed. But the problem of how to manage this multiple system change has not been adequately addressed.

MIS represents a sociotechnical system, and it must be implemented as such, with awareness of its structural implications. When an MIS is installed or changed, the purpose is usually to improve organisational functioning, make the transformation process in the firm more efficient, or to improve the quality of organi-

sational outputs (Marcus and Bjorn-Andersen 1987). A holistic view of the organisation thus requires that management consider more than the IS itself in MIS change projects, since the ultimate goal is not to change the MIS but rather to improve total system functioning.

Adjustment of the social, system to organisational change may occur more slowly than technical system adjustments. So, one of the reasons is the concentration on the technical aspects of the system rather than on the social aspects of it.

4.2. Behavioral problems

MIS failure often occur at the implementation stage, after the system has been labeled technically sound (DeSanctis and Courtney 1983). In general, such failures occur because either:

a) designers neglect to recognise the importance of including human variables in the system, or b) designers attempt to incorporate users into system planning and design, but do so unsuccessfully. Systems designers frequently ignore behavioral variables, both as components of models and as they affect the implementation of projects.

Lack of management involvement in MIS design contributes to the failure of many computer-based systems. In many situations both managers and designers assume that a manager need not understand how this IS works, but only how to use it. Top management may fail to recognise the necessity for planned changes in organisation structure and behavior that are required to make profitable and imaginative use of computerised information processing possible.

Research shows that only in rare cases have significant planned changes occurred in organisational structure or behavior

following installation of an MIS (DeSanctis and Courtney 1983, Franz and Robey 1984). As a consequence, internal decision performance was not fully developed; management never took advantage of human resource information stored in elaborate personnel files, and new options in decentralising responsibilities or control approaches were exposed.

Referring to the users, we can say that many employers are aware that their staff know little about computers but, draw the shortsighted conclusion that it is not worthy trying to explain the changes that are proposed. Others, fail to realise that the introduction of an IS is of a far wider significance than simply to those who will work with it, and thus confine their training and briefly to a small, portion of the workforce. Such narrowness of vision stores up trouble and builds the foundation of alienation and hostility towards the IS.

4.3. Lack of training

As technical specialists, systems analysts are often inadequately trained in most aspects of business enterprise, particularly psychology and human relations. It has been shown that determining information needs of management was the one phase of MIS design which requires skills not usually possessed by systems analysts or programmers. This is due in part to overconcentration in technical and quantitative areas by MIS and computer science programmes.

Additionally, the growth of information technology has been so rapid that information specialists find it difficult to keep in touch with areas outside their speciality that are important to business firm (Bjorn-Andersen 1984, Robey 1981).

4.4. Effects of telecommunications

The technology of information has moved from automation of operational functions during the 1950s and 1960s into computerisation of strategic decision models on the 1970s. During the 1980s information exchange has been conceived of in terms of the total communication network of the organisation, particularly as automated data systems expand to include all types of IS, from telephones and word processors to satellites (Megarry 1984, Reynolds 1988, Senn 1987).

Corporate communications are becoming increasingly intertwined as information processing and transmission become faster, cheaper and more widely available through a wide variety of media. Sophistication of telecommunications, for example, may be substituted for long-distance executive travel as satellites transmit pictures, voices and graphics simultaneously from one conference room to another across the country or even around the world (Megarry 1984). Eventually the entire cooperation of the office may be automated; use of electronic terminals may be substituted for conventional communications with today's relatively centralised offices and work facilities.

As communications and information processing continue to merge and expand in their influence within the organisation, the implication is that any technological change will involve psychological and structural change as well. Thus, the tie among the structural, social and technical systems of the firm will become stronger and more complex.

Another reason that we have to examine is the politics of data. We think that power and politics of data are the main cause of counterimplementation in information system development. Thus, one of the following chapters is absolutely dedicated to the IT and power change in organisations.

5. EFFECTS OF IS IN THE ORGANISATION

As it is well-known, there are many effects of IS in the organisation. The most important of these are discussed in the following:

5.1. Quality of jobs

The research literature on the impact of new information technologies on job content and job satisfaction provides a mass of contradictory findings. The wide range of informed opinions can best be defined by describing the two extreme positions deskilling and upgrading.

Deskilling manifests itself in two ways: intraoccupational changes, where the skill content of a particular job decreases over time, and interoccupational changes, where the number of people in skilled jobs increases. Thus, the deskilling position implies that new information technologies produce a more polarised pyramidal distribution of skill: a mass of unskilled clerical workers at the bottom and a small number of "conceptual workers" at the top, alongside management.

On the other hand, several researchers have argued that computerisation and other new information technologies upgrade rather than deskill white-collar workers (Bariff and Galbraith 1978, Long 1988, Marcus and Bjorn-Andersen 1987). They support that automation primarily occurs in already routinised work situations; the new technology takes the drudge work out of information processing by automating filing and information retrieval, preparing repetitions paperwork, doing simple computational tasks and so on. As automation absorbs many of the manual aspects of infor-

mation processing, humans have more time to concentrate on conceptual and decision making.

From the above, it is shown that the clerical workers will be the potential victims, because their jobs can be easily replaced by the technology. Supporters of this view (upgrading) say that these clerks can be retrained and can be used in other jobs (file clerks become data processing and entry clerks). With upgrading, then, the impact of IT is a net increase in skill and job satisfaction.

The explanation for these opposed viewpoints is not that either group of observers is wrong, but that both (deskilling and upgrading) occurring within white-collar occupations. The riddle, then, is to determine which tendency predominates. But this task is far from the aim of this paper. We are just interested here in the fact that with the information systems the quality of jobs is changed.

5.2. Organisational dealings with clients and customers

Social relationships within organisations are not the only ones to change in response to new bureaucratic uses of information. Relationships between organisations and their environments (organisation as an open system) - particular the general public- are also affected. It is easier to collect, store, analyse and use information with modern information technologies and this is bound to make a difference in how organisations interact with the public.

This category of relationships has been the focus of much less theoretical attention and empirical investigation than the previous one. A few authors have focused on the growing appetite of centralised organisations, especially governments, for information on the people with whom they deal (Bariff and Galbraith 1978, Bjorn-Andersen and Pedersen 1980, Marcus 1983). Other authors have speculated about new kinds of information services that compu-

terised organisations could provide and the concomitant changes that could be expected in modern ideas of what organisations are and do (Hedberg et al. 1975, Keen and Scott Morton 1978, Robey 1981).

Furthermore, economic forces will lead to further automation. It is widely acknowledged that human beings are becoming more and more expensive, relative to computer time. Hiring people to deal with the general public may thus become a luxury that organisations feel they cannot afford. A major New York bank recently tried to institute rules permitting only account holders with substantial deposits the privilege of doing business with human tellers (Senn 1987). The effort was abandoned in the face of public protest and editorial reproach, but one can hardly doubt that similar moves will be attempted elsewhere.

It would be wrong to conclude that the growing reliance on computing for mediation between organisations and the public must necessarily restrict and impoverish these relations. Computerisation, after all affords the capability of providing more information to more customers or account holders in less time.

5.3. Management decision - making process

Researchers have frequently observed that control of information is a source of power. New technologies which alter the quality and availability of information are likely to shift balances of power between various groups of organisational actors-workers, supervisors, middle managers, executives e.t.c. (Keen 1984). The rerouting of information may also create new dependencies between parts of organisations and dissolve old ones, paving the way for structural changes.

The next section is referred in the power of information and the

politics of data in general. For that we would like to analyse this effect during the discussion in the next section.

6. POLITICS OF DATA

Whenever new technology is introduced, it moves through a series of phases. From the invention phase, where the inventor himself is struggling to master it, to the final phase where society is changing in order to accommodate the new innovation and exploit it to its fullest extent.

The wider societal implication of the use of the technology is normally not taken into consideration until the last phase which is usually the time when different groups become aware of the power implications and start preparing themselves for an active stance. At this point in time, power changes have already occurred and any activity aimed at restoring status quo is termed Political (Marcus 1983).

It is our conviction that IT has reached such an extension that it is justifiable to talk about a transition from an industrial society to an information society. The third wave is here and we are going to see substantial power changes in relation to this transition.

6.1. Intraorganisational power

The concept of power originates from the political science and it is intuitively understood to mean that A has the power over B to

the extent that he can make B do something that B might not otherwise do (Bjorn-Andersen 1984). Dimension of power included source, means, amount and scope. Various sources of power e.g. expert, reward and legitimate, have been proposed and studied.

Traditionally, the impact of IS on intraorganisational power has not been a research focus. Most studies of the effects of IS on organisations have been limited to structural characteristics which are somewhat easier to measure (DeSanctis and Courtney 1983). Although IS research has not directly addressed the distribution of power, some studies have considered this issue. Recent emphasis upon the political processes affecting decision - making in organisations provides a new impetus for studying power.

In general we can say that the concept of power has two applications:

The first relates to the power of individuals who provide source of information, which are necessary for task, performance and evaluation. A number of studies indicate that the ability of individuals to control information provides perceived power over other individuals (Keen 1984, Long 1988, Marcus 1983).

The second application relates to the process of producing information -the IS function. A number of studies have shown that the services provided by organisational subunits affect their power in relation to other organisational subunits (Keen 1984, Markus and Bjorn-Andersen 1987).

The mission of MIS is to provide managers with useful information, presumably so that they can cope better with variances arising from their production technologies and from the external units that supply inputs to and distribute outputs from the core technology (Davis and Olson 1985, Earl 1990). The information required to cope effectively with uncertainty is distributed throughout the organisations in a non-random way; some people/groups have more access to this than others. That gives them power. Information is a resource that symbolises status, enhances authority and shapes relationships (Keen 1984).

Departments or individuals have influence only because they have a data monopoly. Finance and planning for example may own data on capital allocations, which gives them greater influence on the decision-making process. People and organisational subunits may differ in the extent to which they actively seek to gain power, but it is unlikely that they will voluntarily give it up. When the introduction of a computerised IS specifies a distribution of power which represents a loss to certain participants, these participants are likely to resist the system. That is, information systems redistribute data and are sometimes intended to break up monopolies. In the following section, we analyse how this redistribution of power occurs under the help of the IT.

6.2. Distribution of power

6.2.1. Vertical distribution of power

Speculative analyses differ on the question of whether greater centralisation or decentralisation results from IT. Researchers have shown the absorption of middle management into the ranks of their superiors and subordinates, the upward shift of planning and a trend toward centralisation (Bariff and Galbraith 1978, Bjorn-Andersen and Pedersen 1984, Pettigrew 1980). These organisational changes would tend to shift the locus of power upward. These middle-level managers who remained would have less discretion than before since they would be supervising according to standardised procedures and decisions set from above.

A further indication of centralisation is the development of executive IS that allow top-executives to bypass line administrators and to monitor activity on the "factory floor" via computer tallies. However, others suggest that IT takes over routine decision-

making at lower and middle levels, thereby increasing the capacity of these levels to handle less routine decisions (Marcus 1983, Senn 1987). The result is greater decentralisation.

In general we can say that, when a system centralises over data, the individual or subunit who gains the control is likely to accept the system readily, while those units losing control are likely to resist, even if they receive access to larger amounts of data in return. Similarly, decentralisation of control over data is likely to be resisted by the formerly controlling unit and to be accepted by units gaining control. But the main point here is that redistribution of power (whether centralisation or decentralisation) exists.

6.2.2. Horizontal distribution of power

Most of the literature dealing with IS and organisations has been concerned with vertical authority and control issues (Keen and Scott Morton 1978, Marcus 1983, Pettigrew 1980). Since many administrative problems arise over the control and coordination of different sub-units, the relationship of the IS to this aspect of structure is of considerable interest.

In the decision-making process, the different "decision-making units" will have to arrive at a common solution. In the face of opposition each "decision-making unit" will attempt to influence the common outcome so that it conforms to its own preferences. Its capability to do this depends on the nature of the operational and decision-making task, how easily the decision-making unit can be replaced or substituted for, and how efficient is its control of the IS.

Interdepartmental conflict is often attributed to mistrust, insufficient information sharing for planning and type of performance measures. In order to achieve better firm-wide utilization of resources, shared access to planning and operating data for sequentially-linked subunits should minimize potentially dysfunctional

tional gaming strategies and tend to equalize power. As the level of trust between subunits increases the need to gather more objective data may decrease in order to achieve joint-success. A complementary, yet essential, element is the use of cooperative rather than competitive, performance criteria. IS designers can influence the degree of data sharing and thus the equalisation of subunit power.

From the above analysis it is obvious that IT and information systems in general redistribute power in an organisation. Independently of the way that power is redistributed, persons in the organisation who lose power will resist. The way that they will react is not known. People can alter systems as they use them and thus prevent the realization of implied power distributions by sabotaging the system, providing inaccurate data, not using the system at all, keeping other sets of record, circumventing the intent of the system while obeying the letter and many other ways.

7. WHAT THE MANAGEMENT OF ORGANISATION MIGHT DO

Resistance to change can be managed. Most resistance has a logical cause, and understanding the cause, enables managers to work with employees to accomplish implementation. The best method of helping workers towards a more realistic assessment of computers is through a program of education and familiarization. The purpose is to inform all the employees about the principals on which the system works and to encourage them to handle the equipment.

Referring to the possibility of redundancy, the history of computing suggests that this is unlikely to occur, as historically new

jobs have been created to replace those no longer necessary. It is therefore important to stress those reasons for development not associated with cost savings. In fact, avoiding mention of "profitability" and "efficiency" would be advantageous as those words bear a connotation of reduced staff requirements. The purpose for development associated with better management information and ability to increase throughout of work without employing additional staff, should be stressed.

Additionally, small scale projects and incremental changes are more easily to be achieved. The management of the organisation should avoid large-scale projects. With the small-scale projects the management can see if the project has achieved its target or not. This is not the case with the large-scale projects.

Furthermore, there is a delicate balance to be struck in the process of consulting workforce. It is management's business to manage, not to abdicate decision-making in order to court popularity. Nevertheless the process of involving the workforce in the decision to computerise should be started early and carried out with sincerity. The reason is not any trendy belief in cosmetic "consultation" for its own shake: it is simply a matter of enlightened self-interest. Management simply does not know enough about the day -to- day working practice of its workforce to anticipate all the problems which a computer may bring in its work. Participation helps ensure that the change meets the needs of people affected by it.

Finally, there is a very simple but seldom-used short-cut to "sweetening" employee attitudes to computers: pay them more. Everyone is pleased to get more money, and some of their pleasure will rubb-off in kinder feelings toward the computer. If a job-working with the computer is more demanding or tiring than the previous job, it may be only fair for management to recognise this. However, the possibility of increased wage costs must be considered carefully by management at the outset, when considering whether or not to computerise.

8. CONCLUSIONS

From the above analysis we can argue that information systems lead to significant changes in the structure of the organisation. For one reason or the other discussed earlier the people may resist the introduction of new technology. Cases have been recorded which refer to sophisticated technical systems failing, because of actions taken by the people required to operate these systems. In fact people constitute the most vulnerable part of any system. The management of the organisation has to realise this situation very early in the development stage and not when signals of failure start to appear. Because of the politics of data, and the fact that information is power in the organisation, people who have got the information, have got power. As they do not want to lose this power, they refuse to redistribute the information. Information systems usually redistribute power, break-up monopolies, and change the existence structures. This is the main reason that IS find opponents in their introduction into the organisation. The management of the organisation has to take into account this fight in the process of implementing new technology. In general we can argue that effective implementation is becoming easier when we have incremental changes, small-scale projects and face-to-face facilitation.

An IS to be successful, like a business, needs good management. The best IS can be successful only when the management wants and can utilise it effectively. The new emphasis on creativity and leadership for management may involve different management training methods. Good management with good workforce willing to accept and use the new management technologies is the main prerequisite for achieving efficiency in the use of IS.

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