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# FACTORS AFFECTING THE PERFORMANCE OF ORGANIZATIONS AND AUTOMATED OFFICE INFORMATION SYSTEMS: LITERATURE REVIEW

by Pierrette Massé Guest Researcher Communications Canada Canadian Workplace Automation Research Centre

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#### SUMMARY

This document presents the results of two literature reviews; the first deals with factors affecting the performance of organizations, and the second with factors affecting the performance of automated office information systems. Each of these literature reviews leads to a model describing the factors in question.

The model concerned with factors affecting organizational performance is based on the factors identified in five empirically tested models-those of Likert (1961, 1967), Litwin and Stringer (1968), Hackman and Oldham (1980), Van de Ven and Ferry (1980) and Peters, Waterman and Austin (1983, 1985), and in two theoretical models, those of Cummings and Schwab (1973) and Becker and Neuhauser (1975). The model is also based on the results of specific studies into those performance factors related to the organizational context, the individuals working there and the procedures inherent in that context.

The model identifies 15 main factors capable of influencing organizational performance. It demonstrates that certain primary factors influence other secondary factors and thereby determine organizational performance (consequence) and, subsequently, employee satisfaction and the quality of work life (results). This is, however, a dynamic rather than static model, since each of its elements is in constant interaction with the others and is thus likely to be influenced and altered as the various elements change over time.

The primary factors identified in this model include factors related to organizational procedures (management techniques, leadership styles, personnel management policies and structure), factors related to individuals (abilities, health) and factors related to the organizational context (technology, physical environment and work conditions). The secondary factors in this model are organizational climate and culture, employee motivation and group processes.

The results of the studies on which the model is based indicate that it is impossible to link organizational performance with a single or even major cause, such as job characteristics or structure, or even to attribute it to certain specific causes, such as leadership styles or climate. Rather, these studies show that a multitude of factors, the effects of which are all interrelated, are capable of affecting organizational performance.

The model concerned with factors affecting the performance of automated office information systems is based on all the documents published in this regard: literature reviews, studies, reports on findings by managers, management experts and workplace automation experts, and the application of theories on resistance to change as they relate to the acceptance of new technologies.

This literature review identified 59 factors, which we have grouped together depending on whether they relate to individuals, the organization, technology or implementation procedures. Of these factors, 15 seem to be particularly significant, given the number of studies that mention them. These are, in order of importance, preparation of a master plan, user training, senior management involvement in the project, identification of project goals, user participation in system development, control and evaluation of results, project-related communications, organizational support, skills of the implementing team, system cognitive ergonomics, user attitudes, relations between the implementing team and users, access to equipment, organization size and degree of project formalization.

The author would caution, however, against hasty conclusions regarding the relative importance of some of these factors, since no objective studies have yet been conducted into this question and the fact that they are included here in this order merely reflects the number of authors interested in them.

The results of this study would seem to show, nonetheless, that the factors that determine AOIS performance are generally specific, and thus differ greatly from the general factors affecting organizational performance.

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#### INTRODUCTION

Bélanger (1983, p. 38) said that each era has its own themes or key words around which the discussion of social problems revolves. Over the past fifteen years, one of these major themes has been productivity growth and, more recently, the more general theme of organizational performance. Such interest can probably be attributed in part to declining American productivity growth in recent years a decline which has not been stemmed by information technologies and also to the inability of analysts in all fields to identify the exact causes of this disaster (Baily and Chakrabati, 1988).

In this context, a vast amount of literature focuses on organizational performance and on identifying the effects of automated office information systems (AOIS) on that performance. Some authors have studied the factors capable of affecting AOIS performance (causal variables or those variables independent of the equation). Other authors have instead considered performance criteria for these systems (resultant variables or variables dependent on the equation). Still others have suggested or developed methods or techniques for measuring these effects. It should be noted that these methods or techniques are primarily for measuring system performance "criteria," since very few authors are interested in methods or techniques for measuring system performance "factors."

This document focuses on the first of these aspects, ie, factors affecting AOIS performance. We believe, however, that AOIS are not implemented in a vacuum, that is, in organizations that perform extremely well independent of factors capable of affecting their performance. Rather, these systems are implemented in organizations that are already influenced by these factors and their performance is consequently positively or adversely affected. Thus, we believe that the impact of AOIS on organizational performance cannot be assessed without taking into account these general performance factors, along with the performance of the organization prior to the implementation of such systems.

Accordingly, before considering the specific factors affecting AOIS performance, the author wished to identify these general factors and to determine their effects. This took the form of literature reviews relating to each of these aspects in turn. The results of these literature reviews are contained in the two chapters that make up the body of this report.

Chapter I describes the factors affecting organizational performance identified in seven models devised for this purpose, five of which are empirically tested models those of Likert (1961, 1967), Litwin and Stringer (1968), Hackman and Oldham (1980), Van de Ven and Ferry (1980) and Peters, Waterman and Austin (1983, 1985) and two of which are theoretical models those of Cummings and Schwab (1973) and Becker and Neuhauser (1975). It also presents the results of numerous studies into specific factors affecting organizational performance. We have grouped these factors together under the headings of organizational context, individuals, and procedures.

Chapter II summarizes the results of studies into those factors affecting AOIS performance. We have grouped these factors together under the headings of individuals, the organization, technology and implementation procedures.

At the end of each chapter, the reader will find a model describing the factors considered. These models take into account both the literature consulted and subsequent considerations.

As we have seen, many researchers have focused on factors affecting organizational performance. None have as yet attempted to bring together all those factors capable of affecting performance, based on the results of empirically tested theories and of all the specific studies conducted into this question. This study thus breaks new ground in this regard.

Moreover, at present there is only one model that summarizes all the studies conducted into those factors affecting AOIS performance, and that model, dating from 1981, deals specifically with management information systems. Accordingly, our model is also innovative in this regard.

The author's aim in this document is to produce two models, the first relating to those factors capable of affecting organizational performance, independent of the implementation of automated office information systems (AOIS), and the second relating to those factors capable of affecting organizational performance when such systems are implemented.

In order to produce the models, two literature reviews were conducted, one concerned with general factors affecting organizational performance, and the other with specific factors affecting AOIS performance. We believe that AOIS are not implemented in a vacuum, that is, in organizations that perform extremely well independent of factors capable of affecting their performance. Rather, these systems are implemented in organizations that are already influenced by these factors and their performance is consequently positively or adversely affected. We believe that the impact of AOIS on organizational performance cannot be assessed without taking into

account these general performance factors, along with the performance of the organization prior to the implementation of such systems. Accordingly, before considering factors specific to AOIS performance, the author wished to identify these general factors and to determine their effects.

The results of the literature reviews are contained in two chapters that summarize the findings of studies conducted into general factors affecting organizational performance (Chapter I) and specific factors affecting AOIS performance (Chapter II). At the end of each chapter, the reader will find a model describing the factors considered. These models take into account both the literature consulted and subsequent considerations.

Before the results are presented, it is appropriate to define the main terms used throughout this document: factors, criteria, indicators, performance, AOIS, and organizations.

#### Factors

"Factors affecting performance" refer to the various elements that contribute to or determine performance. A distinction should be made between research into these factors and the "critical success factors" (CSF) methodology, which involves using structured dialogues between a skilled CSF analyst and the key personnel of a firm to make explicit "those managerial or enterprise areas that must be given special and continual attention to bring about high performance" (Boynton and Zmud, 1984, p. 17). That method is thus concerned with determining the success factors specific to an organization at a given point in its evolution, and not with identifying those factors that are generally recognized as being capable of affecting organizational or AOIS performance.

#### Criteria and indicators

By "performance criterion", we mean a standard or norm on the basis of which performance may be judged. By "performance indicator", we mean a variable for which some values reflect the attainment of this criterion. Accordingly, productivity would be a performance criteria, while the relationship between hours worked and goods produced, for instance, would be a productivity, and thus performance, indicator.

#### Performance

Performance "is a complex construct which reflects the factors used by decision makers to assess the functioning of an organization" (Van de Ven, 1976, p. 73). Szilagyi (1981) lists 14 of these criteria (effectiveness, productivity, efficiency, profit, quality, innovation, safety, growth, attendance, retention, satisfaction, motivation, adaptability and development), while Sink (1985) considers only 7, including the first 6 mentioned by Szilagyi, to which he adds the quality of work life. Many authors, however, take into account only some of these criteria, the most frequently

mentioned of which is productivity. For the purposes of this study, we have not discounted any of these criteria, but have considered all of the ones presented by the authors as being capable of reflecting organizational performance.

#### AOIS

By AOIS, we mean "an integrated environment in which different innovative technologies are coordinated to support the information processing functions of office workers" (Borko, 1983, p. 206). This definition thus covers not only systems designed to process large-scale transactions, but also "ad hoc" or smaller applications, such as systems to assist in decision making or provide management information, as well as office automation systems and local networks.

## Organizations

4

By "organizations", we mean all public- and private-sector firms, institutions and bodies.

## **CHAPTER I**

## FACTORS AFFECTING THE PERFORMANCE OF ORGANIZATIONS

In order to identify those general factors capable of affecting organizational performance, the theories and models specifically designed for this purpose were first consulted. Then those studies aimed at identifying the effects of certain specific factors (not related to any theory of organizational behaviour) on such performance were consulted. The results of each of these literature reviews are presented below.

#### 1.1 Models

Most of the models designed to explain organizational performance can be found in the literature on organizational efficiency. This term is commonly used by organizational theorists and modelists, while practitioners prefer to use "performance", the term chosen here for three reasons. First, there is a fundamental distinction between the constructs covered by these two terms. Second, the author considers herself an organizational practitioner rather than a theorist. Finally, there is considerable controversy over the meaning of the term "efficiency". Thus, while most of the models discussed below relate to organizational efficiency, they will be presented here as models explaining organizational performance.

Many such models are available, with varying levels of analysis; some are primarily concerned with individual behaviour, while others look at group processes or the organization as a whole, and yet others attempt to bring together all of these types of analyses (Hausser, 1980). This document will not deal with all of the models surveyed. Rather, two concomitant criteria were applied to select appropriate models for this study: (1) they had to be based on solid empirical research, regardless of their level of analysis; and (2) they had to be sufficiently simple to be understood and applied by organizations interested in determining what effect the implementation of AOIS would have on their performance.

Accordingly, the Lawrence and Lorsch (1969) model was not included here, although it has had some empirical testing, because it seemed too demanding and complicated for the study's intended audience. Its authors see organizational performance as being the organization's ability to respond to the needs of the environment by means of transactional strategies. This means that both market needs and the resources available to the organization must be evaluated to ensure proper transactions with the environment. On the other hand, since very few models have an empirical basis, the first criterion was dropped in two cases: the Cummings and Schwab (1973) and Becker and Neuhauser (1975) models. This decision was based on the fact that the authors of the first of these models emphasize a set of factors related to individual skills and personnel management

policies, which are neglected by the other modelists, but identified by a number of other researchers. Also, the authors of the second model offer a synthesis of most of the factors mentioned by all the authors consulted as determining organizational performance.

A total of seven models are included here, presented below in chronological order by date of publication, with the exception of the Becker and Neuhauser (1975) model, which has been saved for the end. These are the models developed by Likert (1961, 1967), Litwin and Stringer (1968), Cummings and Schwab (1973), Hackman and Oldham (1975, 1980), Van de Ven (1976), Van de Ven and Ferry (1980), Peters and Waterman (1983), Peters and Austin (1985), and Becker and Neuhauser (1975).

#### 1.1.1 <u>The Likert model</u>

In the early 1960s, Likert (1961, 1967) proposed a theory of organizational performance that has since been widely read, studied and accepted (Hausser, 1980). This theory proposes three types of variables to explain organizational performance: causal variables, intervening variables and end-result variables.

Causal variables are independent variables which the organization can control, such as its structure, management policies, skills, behaviour and business and leadership strategies. Even if, as Likert acknowledges, general business conditions are a variable capable of affecting organizational performance, he does not include them in his model's list of causal variables because such a variable cannot be altered or eliminated by the organization or its management methods.

Intervening variables are intermediate variables that reflect the internal state and health of the organization, such as its members' perceptions, attitudes, motivations and loyalty, and their collective ability to interact, communicate and make decisions effectively.

End-result variables are dependent variables that reflect the organization's achievements, such as its productivity and profitability, and the quality of the goods and services it produces.

These three types of variables operate systematically, as in an "input-throughput-output" process, and certain end-result variables for one group of employees may become causal variables for another group. These variables are also located on a continuum ranging from highly favourable

to highly unfavourable, and apply either to the entire organization, to individual departments or units, or even, when appropriate, to individual supervisors. These various aspects are described below.

For Likert, the keystone of the organization is the group, consisting of the supervisor and his immediate subordinates. The organization is essentially made up of a group structure, with "linking pins" between the groups, ie, individuals who are members of more than one group, to form a pyramid within which the work is distributed. Figure 1 illustrates this aspect of his model.

Within each of these groups, the supervisor's attitude toward his subordinates determines their own behaviour toward each other as well as their work performance. The links between the supervisor's performance and that of his subordinates within each group, as well as between the various groups (Figure 1) which are all linked together through their supervisors, gradually steer the organization toward a management system, a whole set of coherent and distinct practices, behaviours and beliefs.

Likert identifies four types of management systems: system 1, called exploitiveauthoritative, system 2, benevolent-authoritative, system 3, consultative, and system 4, participative group. These systems are primarily distinguished by their means of exercising control, setting goals, making decisions, communicating, motivating employees and exercising leadership.

According to Likert, the management system that seems to operate best in North America is participative. Such a system encourages the open sharing of information and allows the members of the organization to influence decisions and control events that affect their work life. This system is also based on the group; it promotes co-operative team work rather than individual relations. Helping relationships and stringent performance objectives set by the group are the key to its motivation.



#### 1.1.2 The Litwin and Stringer model

The Litwin and Stringer model (1968) is the result of extensive experimental and empirical studies conducted to verify the influence of leadership styles and organizational climate on employee motivation, satisfaction and performance. This model is presented in Table I. It shows that different features of the organization (its technology, organizational and social structure, leadership styles, management assumptions and practices, and decision-making process, along with the needs of its members) generate an organizational climate that, in turn, arouses or suppresses certain motivational tendencies, thereby resulting in various consequences for the organization (productivity, satisfaction, employee retention, innovation, adaptability and reputation). TableI also illustrates the importance Litwin and Stringer place on the interaction between perceptions and behaviour and on the feedback between performance criteria and their determinants.

## Tableau I

# The Litwin and Stringer model

Organisation system	Perceived organizational environment	Aroused motivation	Emergent behavior	Consequences for organization
Technology		Achievement	Activities	Productivity
Organizational structure		Affiliation	Interactions	Satisfaction
Social structure	Dimensions of organizational	Power	Sentiments	Retention (turnover)
Leadershin	climate (or role-set expectations)	Agression	-	Innovation
Leadership		Fear		
Management assumptions and practices			<b>≜</b>	Adaptability
Decision-making processes				(image)
Needs of members	s of members			
▲				
		retroaction	· · · · · · · · · · · · · · · · · · ·	

Source : Adapted from Litwin and Stringer (1968)

In their model, the organizational climate is <u>the</u> intermediate variable, which mediates between organizational system factors and motivated behaviour. For them, this concept essentially corresponds to the perceptions held by the members of the organization regarding nine dimensions of their work environment: the organizational structure, responsibilities, warmth, support, reward and punishment systems, conflicts, standards, identity and risk taking. Litwin and Stringer distinguish, for instance, between achievement motivation, affiliation motivation and power motivation, and postulate that the various dimensions of the climate may have different effects on each of these types of motivation.

Studies conducted on their model show that:

- 1) it is possible to create distinct organizational climates by varying the leadership styles adopted by organizations;
- 2) such climates may be created very quickly and their features are relatively stable;
- 3) different departments or even different work groups within the same organization tend to have different climates corresponding to the requirements of the tasks to be performed. Thus, instead of a single organizational climate, one should refer to climates or sub-climates.
- 4) these different climates stimulate or give rise to different types of motivation among employees and strongly influence both their satisfaction and performance levels.

The results of these studies also show that: Achievement motivation seems to be stimulated or aroused by climates that (a) emphasize personal responsibility, (b) allow calculated risks and innovation, (c) give recognition and reward for excellent performance, and (d)create the impression that the individual is part of an outstanding and successful team. It is also important that there not be a high degree of structure and constraint (in the form of rules, procedures, formal communication channels) (p 189).

The most important and spectacular determinant of climate would seem to be the leadership style of managers and informal leaders. The emphasis placed by a leader on respect for the rules, the type of goals and standards he sets, and primarily the nature of his communications and informal relations with his employees will greatly influence the climate.

(

#### 1.1.3 The Cummings and Schwab model

The Cummings and Schwab model (1973) differs from earlier models in that its authors consider both abilities and motivation the major determinants of organizational performance. For them, these two elements are joint intermediate variables that mediate between organizational variables and performance.

The organizational variables of concern to these researchers essentially relate to personnel management policies: selection procedures, training programs, wage administration, job design, performance evaluation and reward systems. Some of these variables act mainly on the abilities of the members of the organization, while others act on their motivation. Those variables capable of influencing their abilities are mainly selection procedures and training programs, while those capable of influencing their motivation are mainly the leadership style exercised by the organization and its management practices.

This last part of the Cummings and Schwab model thus coincides with those of Likert (1961, 1967) and Litwin and Stringer (1973). The former differ from the others, however, in that they claim that performance appraisal and recognition through reward systems are among the main means of improving performance. Like Litwin and Stringer, Cummings and Schwab also mention job design as another means.

#### 1.1.4 Hackman and Oldham model

Hackman and Oldham (1975, 1980) are the researchers most interested in the effects of job design on individual performance, however. Based on studies conducted over more than 20 years, their model has become a classic in this regard. It stipulates that certain core job characteristics will create certain critical psychological states that will, in turn, produce certain personal and work outcomes. Figure 2 identifies the variables considered in this model.

In the left-hand column, it lists the five job characteristics capable of having such effects on individuals: 1) the variety of skills required for the job; 2) task identity, ie, its completeness; 3) task significance, ie, its impact on the lives or work of others; 4) autonomy; and 5) feedback. These five characteristics of the job correspond to what Hackman and Oldham called its "motivating potential".

In the middle column, Figure 2 refers to three critical psychological states influenced by this motivating potential: experienced meaningfulness of the work, experienced responsibility for outcomes of the work and knowledge of the actual results of the work activities. The variety, completeness and significance of the task will increase the experienced meaningfulness of the work, while the degree of autonomy exercised in performing the task will increase the experienced responsibility for outcomes of the work, and feedback will improve knowledge of the actual results of the work activities.

Finally, in the right-hand column, Figure 2 shows the personal and work outcomes generated by these critical psychological states: 1) high internal work motivation, general satisfaction with the work and satisfaction with personal growth (personal results); and 2) an increase in work effectiveness, ie, in the quantity and quality of work provided, and particularly in the latter (work results). The authors of this theory indicate that the quantity of work will probably not increase unless there are serious shortcomings with regard to motivation or work design before such changes are made.





In their original model, Hackman and Oldham (1975) had also mentioned lower absenteeism and turnover as effects on work of the motivating potential of the job. However, following studies conducted on their model, they stated in 1980 that additional research was necessary before any definite claims could be made in this regard. Further research has shown that improvements in the motivating potential of the job may increase the most talented employees' involvement in their work and in the organization, but may decrease that of the least skilled employees, thereby contributing to higher absenteeism and turnover in their case.

If we return to Figure 2, to complete our look at the Hackman and Oldham theory, we note that the motivating potential of the job is influenced by three moderating variables: 1) job-relevant knowledge and skill; 2) growth-need strength, ie, self-fulfilment needs; and 3) satisfaction with aspects of the work context, particularly job security, compensation, co-workers and supervision.

These three factors become particularly significant when they occur in combination. Accordingly, the poorer an employee's job-relevant knowledge and skill, the lower his growth needs and the less he is satisfied with his work context, the less any changes in the core job characteristics will have any positive effects on his critical psychological states and, consequently, the fewer positive personal and work outcomes there will be. The inverse is also true.

#### 1.1.5 The Van de Ven and Ferry model

The Van de Ven and Ferry model (1980) is the result of a longitudinal research program begun in 1972 at the Center for the Study of Organizational Innovation at the University of Pennsylvania. This program was aimed at developing a theoretical framework, a series of measurement instruments and a longitudinal evaluation process for organizations that would be scientifically valid and practically useful. This program was based on a definition of the complex organization as an open social action system consisting of:

«many differentiated but interdependent subsystems, each with its own program for structuring its cyclical activities. These subsystems are linked together as an overall organizational system through information and resource flows» (Van de Ven and Ferry, 1980, p. 7).

Any in-depth evaluation of complex organizations therefore requires a theory taking into account two levels of analysis, both macro, ie, the organization as a whole, and micro, ie, not only

units or departments, but also the jobs performed by individuals and the relations within and among units.

Figure 3 illustrates the various levels of analysis considered in this theory. Each of these levels has a certain number of dimensions attached to it that Van de Ven and Ferry believe should form the basis of any in-depth evaluation of organizations. These various dimensions correspond to the performance factors and the performance criteria considered by these researchers. We are only concerned here with the former, and will present an overview of those factors selected by them and the reasons for their choice. It will be seen that they all relate either to contextual or structural aspects of the units of analysis considered.

#### The macro-organizational level

For Van de Ven and Ferry, an organization's "design" is neither a natural nor a predetermined condition. Rather, it is the result of strategic choices made implicitly or explicitly by the organization's key decision-makers concerning: 1) the domain in which the organization operates (functions, products, services, target populations and markets); 2) the production function (quotas and resources); 3) the organization's design (division of labour and resources, interdependence of units, structure of authority and reporting relationships). Any in-depth evaluation of organizations must therefore consider each of these aspects. To understand the domain chosen by an organization, one must know its history, age and growth stage. Moreover, since the choice of this domain involves varying degrees of uncertainty, complexity and restrictiveness of environments, all of which will influence the alternatives available in solving the production function problem and designing the overall structural configuration of the organization, all of these aspects must also be considered.

#### The unit level

Van de Ven and Ferry consider the unit or work group the basic and smallest source of collective behaviour within organizations. The define the work group in the same way as Likert (ie, as being composed of a supervisor and everyone reporting directly to him), and also describe the links between the various groups in an organization as "linking pins". Unlike Likert, however, they are not interested in the perceptions or reactions of the members of these groups, but rather in their context (the unit's contribution to the organization, its position on the organization chart, the nature of the work performed, its size) and their structure (specialization, expertise, centralization, standardization, performance standards).



Key to Number:

1 = Overall organization focus of analysis
2 = Organizational unit focus of analysis
3 = Individual job or position focus of analysis

4 = Relations within and between units focus of analysis

Fig. 3: The Van de Ven and Ferry model, adapted from Van de Ven and Ferry (1980)

#### Job design

Van de Ven and Ferry's theory on the effects of the task on organizational performance is based essentially on the work of Hackman and Oldham and their predecessors. These two groups of researchers consider the same characteristics of the job, but from different viewpoints. Van de Ven and Ferry focus on behaviour rather than on attitudes toward the job because they see behaviour as being not only more objective but also easier to observe, control and change. This also allows them to draw a parallel between the dimensions assessed with respect to both work groups and the job itself (specialization, expertise, standardization, discretion and incentives). They also consider certain contextual variables (job requirements, individual characteristics) ignored by Hackman and Oldham, but neglect the psychological states that Hackman and Oldham thought resulted from the job characteristics.

#### Relations within and between units

Van de Ven and Ferry see the circulation of resources and information within organizations as basic elements in the organizational process and assess these elements in terms of direction, frequency and quantity. They also claim that focusing on these aspects of interunit relations allows them to avoid using the value-laden concepts of co-operation, conflict and other attitudinal impressions that have plagued most other previous attempts at assessing such relations.

#### 1.1.6 The Peters. Waterman and Austin model

Peters developed his model in two subsequent books (Peters and Waterman, 1983; Peters and Austin, 1985). The first tried to explain the excellent performance of 43 big companies by looking at specific characteristics of these companies. Table II lists the eight attributes that Peters and Waterman use to explain such excellence.

Three of these attributes relate to the organization's structure: attributes 3 (autonomy and entrepreneurship), 7 (simple form, lean staff) and 8 (simultaneous loose-tight properties). Two of the other attributes are more concerned with the values promoted by the organization, although they also relate to its management style: attributes 2 (close to the customer) and 4 (productivity through people). Finally, the other three attributes relate specifically to its management style: attributes 1 (a bias for action), 5 (hands-on, value-driven) and 6 (stick to the knitting).

## Table II

## Attributes explaining organizational performance according to Peters and Waterman<sup>1</sup>

A bias for action: a preference for doing something - anything - rather than sending a question through cycles and cycles of analyses and committee reports.
Staying close to the customer - learning his preferences and catering to them.
Autonomy and entrepreneurship - breaking the corporation into small companies and encouraging them to think independently and competitively.
Productivity through people - creating in <i>all</i> employees the awareness that their best efforts are essential and that they will share in the rewards of the company's success.
Hands-on, value driven - insisting that executives keep in touch with the firm's essential business.
Stick to the kniting - remaining with the business the company knows best.
Simple form, lean staff - few administrative layers, few people at the upper levels.
Simultaneous loose tight properties - fostering a climate where there is dedication to the central values of the company combined with tolerance for all employees who accept those values.

1. Adapted from Peters and Waterman (1983)

The Peters and Austin book focuses on some thirty companies, but in this case they are not concerned only with big companies or their senior managers. The sample includes small and medium-sized companies, branches of big companies, and even some public sector health-care and education agencies. These companies were observed over a two-year period and managers at all levels were consulted.

When the Peters and Waterman book was published, some critics accused the authors of oversimplifying their explanation of organizational performance. After observing these companies, Peters and Austin decided, on the contrary, that they had not simplified enough. Figure 4 illustrates their reworked model. It shows that it is now composed of only four factors: care of customers, constant innovation, focus on people and the element that connects all the others leadership.

For Peters and Austin, leadership means "vision, cheerleading, enthusiasm, love, trust, verve, passion, obsession, consistency, the use of symbols, ... creating heroes at all levels, ... and numerous other things" (1985, p. 6). Leadership must be present at all levels of the organization, but will lead to nothing if it is not based on a common vision and adherence to its mission and goals and belief in the organization's ability to achieve those goals.





The letters MBWA inside the leadership circle in Figure 4 stand for managing by wandering around. Peters and Austin believe that managers should wander around with their clients, salespeople and employees at least 25% of the time in order to be in touch with the first vibrations of change and the new. They also respond to one criticism of Peters' first model, that it was focused solely on internal factors. By focusing on leadership and on people, the reworked model also emphasises internal factors, but the management practices it recommends, and its concern for clients and innovation, ensure that the organization is always externally focused, always sensing change and nascent change before it occurs.

#### 1.1.7 The Becker and Neuhauser model

In our opinion, Becker and Neuhauser (1975) are the authors who best summarize all the factors enumerated by all the others as being capable of affecting organizational performance, by identifying them precisely and even adding to them. Unfortunately, the resulting model has not been empirically tested. Table III shows the model. It subdivides those variables capable of affecting organizational performance into two groups, ie, those related to resources and those related to procedures. Then it further subdivides resource-related variables according to whether they relate to technology (things) or people. Procedure-related variables are concerned primarily with formal organization.

Although these various groupings represent an ambitious attempt at classification, these authors' originality lies primarily in: 1) their listing of all the variables related to things (working conditions, technology and physical environment); and 2) their consideration of individual health and of conditions affecting individual needs. In their model, motivation remains the key to employee performance, and that motivation is determined by all the variables related to people and the formal organization. Variables related to things contribute only to the organization's technological performance and have no impact on employee motivation and thus performance.

Resource	Procedure-Related Variables	
Technology (Things)	People	The Formal Organization
Working Conditions: Lighting Humidity Temperature Music Safety Rest Periods Ventilation Technology: Raw Materials Job Layout Scheduling Quality of Equipment Maintenance Plant: Architecture Automation Computerization Product Mix Plant Size Percent of Plant Capacity in Use Input Mix Technological Efficiency	Ability (mental, physical): knowledge, skill,education, experience, training, interest, attitude, personality. Health: fatigue, safety, physical strength, illness, disability, alchoholism, etc. Induvidual Needs (physiological, social, egotistic): Affected by - alienation of job activities, leisure time, on job satisfaction, level of aspiration, reference group, sex, age, cultural background, ethnicity, education, experience, career stage, goal congruence, work hours, autonomy, need achievement, know ledge of alternatives, home environnement. Informal Organization: The Work Group: values, norms, peer group, cohesiveness, relation to superiors, collegiality, hawthorne effect. Time Period: season, day of the week, holidays. Structure: division of labor, profession- nalism, unionization. Morale, Motivation Employee Job Performance	Managerial Techniques: budgeting. cost control incentives, Payment Mechanisms, information systems, communication, public relations, prestige of organization, advertising, planning, forecasting, marketing, capital, financier, ability of manager, needs, etc. Leadership Styles, Climate: hierarchical, participatory. Personnel Policies: job content, selection, screening procedures, placement, introduction to the job, work standards, salary and wage levels, fringe benefits, incentives, performance rating, training programs, job. Structure: centralize-decentralize, coordination, cohesiveness, integration, hierarchy, span of control, managerial component, bureaucratization, departmentalization.

# Table IIIThe Becker and Neuhauser model1

1. Adapted from Becker and Neuhauser (1975)

#### 1.1.8 Synthesis and conclusion

We have presented seven models that attempt to explain organizational performance. Each of these models emphasizes certain factors capable of affecting such performance. Likert (1961, 1967) sees them primarily as being organizations' leadership styles and group processes, which affect employee motivation and thus determine organizational performance. For Litwin and Stringer (1968), the key lies primarily in their leadership styles, which generate a suitable climate for stimulating employee motivation and thus organizational performance. For Cummings and Schwab (1973), the significant factor is personnel management policies, which improve employee abilities and motivation, and consequently organizational performance. For Van de Ven and Ferry (1980), organizations' context and structure, their constituent units, the tasks performed by those units, and the relations within and among units all explain their performance. Peters and Austin (1985) see the leadership style practised by organizations, particularly in terms of their focus on their members and clients and their readiness to innovate, as the explaining factor. Finally, for Becker and Neuhauser (1975), various technological aspects of organizations determine their technological performance, while various characteristics of their procedures and their members affect individual satisfaction, motivation and performance and thus organizational performance. Table IV summarizes these data, indicating the principal factors explaining performance selected by the authors of the models considered.

Although five of these models have a solid empirical basis, none of them is commonly accepted. The only way to determine the cause-effect relationship between different performance factors and performance, as well as the co-variations between the different performance factors and indicators, would be to conduct massive longitudinal studies incorporating stringent control over the key variables, and multi-variate analyses of the way in which they related. In addition to the fact that such studies are extremely time-consuming and difficult, the organizational context is not at all suited to them, since organizations are unable to hold still long enough to give researchers the level of control they need (Hackman, 1984).

#### Table IV

Principal factors affecting organizational performance according to the authors of the models consulted



To our knowledge, only three teams of intrepid researchers have resorted to such strategies: the Likert team, whose work was conducted at the Center for social study at the University of Michigan (Taylor and Bowers, 1972), the Van de Ven and Ferry team at the University of Pennsylvania, and the Hackman and Oldham team, from Yale and Illinois universities respectively. The first team's results are difficult to interpret (Goodman and Pennings, 1977), precisely because of the complexity of the analysis of relations among the variables considered. As for the Van de Ven and Ferry model (1980), its own authors recognize that it has not been sufficiently tested to draw any valid conclusions. Hackman and Oldham, for their part, stated in 1980 that the available results indicated that their model was "probably more right than wrong, but that it [was] surely inaccurate and incomplete in numerous specifics" (p 95). They added that: "In sum, while there [was] support in the research literature for the basic job characteristics model, it would be inappropriate to conclude that the model [provides] a correct and complete picture of the motivational effects of job characteristics" (p97). A recent review of these studies, accompanied by meta-analyses intended to verify the validity of their model, led to practically the same conclusion (Fried and Ferris, 1987).

Moreover, a similar conclusion could probably be drawn with respect to all the models described above. This is why we believe, contrary to Hausser's opinion (1980), that rather than choosing a model according to its content of interest, level of analysis, scope of assessment effort or available methodology, it is important to take from each of the suitable models those elements of truth that can be detected and to consider them factors capable of affecting organizational performance. Studies conducted by researchers other than modelists, aimed at identifying the effects of some of these factors, can help to determine which factors are the most likely to affect such performance. We will now consider the results of those studies.

#### 1.2 Specific research

We have broken down into three categories those studies aimed at identifying the effects of certain specific factors on organizational performance: 1) those concerned with factors related to context; 2) those concerned with factors related to individuals; and 3) those concerned with factors related to procedures. This classification corresponds to the one suggested by Becker and Neuhauser (1975), except that we have used the term "context" rather than "things" or "technology." Their model will thus be used in this section of our document as a framework to present the results of studies relating to each of these three sets of factors.

#### 1.2.1 Concerning factors related to context

Among the theorists whose models are described above, only Becker and Neuhauser (1975) mention "things" as being capable of influencing organizational results. For them, all the factors listed under this heading determine the technological performance of organizations and not the performance of their members. Table III (p 25) shows that they subdivide this set of factors into three subgroups relating respectively to the work conditions, technology and physical environment prevailing in organizations.

We have retained their subgroupings, but have added factors related to the time of year (season, day, holidays, etc), that Becker and Neuhauser list among factors related to people. Our definition of the three groups of factors that they relate to things also differs from theirs. By work conditions, we mean work schedules, rest periods, safety, job security and so on. By technology, we mean the equipment or tools required to do the work. By work environment, we mean four groups of variables, ie, those relating to: 1) the work space (physical enclosure, floor area, layout, furniture, windows); 2) ambient conditions (temperature and air quality, lighting, noise; 3) psychosocial factors (privacy, communication, pathfinding, comfort, display and personalization, status communication, appearance; and 4) facilities design and management (participation and occupancy) (Brill, 1984).

We will now consider the studies concerned with the effects on organizational performance of each of the groups of factors related to context. We will not deal here with factors related to the time of year, because we found no studies dealing specifically with this set of factors, although we do know that they are capable of affecting employee performance.

#### a) Work conditions

We found only two studies dealing with the effects of work conditions on organizational performance. One deals with the values of American workers, and shows that contemporary employees are less concerned with job security than were traditional employees (Gregerman, 1981). The other is the largest international survey conducted to date on the theme of productivity (Harris and Etzioni,1981). It took the form of personal or telephone interviews with 4,711 respondents in five countries: the United States, Great Britain, Australia, West Germany and Japan. In the US, 1,201 adults, including company managers, were consulted. One of the questions in the survey involved asking respondents to what extent productivity could be improved using each of 15 means listed. They were offered four possible answers to this question: greatly,
somewhat, not much or not at all. Table V presents the results of interviews with American workers and company managers. It identifies each of the means suggested to respondents, and indicates the percentage of respondents who felt that it could greatly improve productivity.

This table shows that both workers and managers saw safer working conditions and more flexible work schedules as being among the methods least likely to improve productivity. Only 20% (work conditions) and 17% (schedules) of workers felt that these means would greatly improve productivity. Managers were even less inclined to favour these means: 8% (work conditions) and 3% (schedules).

#### b) Technology

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Table V does show that managers and workers differed with respect to the effects of technology on productivity. Only 29% of workers felt that better equipment or tools would greatly improve productivity, while 68% of managers thought so. Thus, for managers, technology was the most efficient means of achieving that goal, while workers saw it as one of the least efficient means of doing so.

One study, that included representatives of 99 US companies, confirmed that managers value this means. That study showed that the acquisition of computer systems was the most efficient means among all the techniques for improving productivity used by these firms. Among other things, it led to an 8% decrease in errors and a 12.5% improvement in products and services (American Productivity Center, 1982). The same study also showed, however, that the most important problem facing the managers of these companies when implementing productivity enhancement programs was the lack of adequate systems and tools for measuring the effects of such programs.

# Table V

	Travailleurs	Cadres
	n = 539	n =192
	~	
	%	%
(Employees) getting financial rewards for productivity gains	43	53
More and better information from management about decisions that affect employees	42	38
Employees being treated with more respect by their supervisors	42	38
Better relations between management and labor	39	48
More favorable attitudes of employees towards (your) employer	38	47
Employees having more say in decisions that affect them	37	16
(Employees) having a greater chance for recognition and promotion	37	41
(Employees) having more job security	36	11
(Employees) having bonuses which rise or fall depending on the company's profits	36	32
Having better fringe benifits	35	3
Use of better equipment or tools	29	68
(Employees) having less pressure on the job	26	2
Having safer working conditions	20	. 8
Having more pleasant physical surroundings at work	19	7
(Employees) having more conventent working hours	17	3

Percentage of public-sector workers and company managers who feel that organizational performance could be greatly imporved using the means listes 1

1. Adapted from Harris and Etzioni (1981)

AOIS are credited with various other benefits, including lower manpower requirements, productivity gains, decreased workload and backlog (Rivard *et al*, 1987), contribution to strategy and corporate competitiveness (Porter, 1985; Spooner, 1986), greater organizational efficiency and improved welfare of members (Rousseau, 1983), improved quantity and quality of documents generated (Ford, 1985), improved organizational communications (Culnan and Bair, 1983), greater in-depth analysis and understanding of information by professionals (Osborne and Rosenthal, 1985), elimination of wasted time and better decision making (Lehrer, 1983), decrease in low-level activities (mail, filing and search for information, setting up of programs and schedules, etc) and increase in more productive activities (Booz, Allen and Hamilton, 1980; Kwon and Hamilton, 1987).

Other authors readily admit that AOIS are the best means of improving white-collar performance (Stankard, 1986), and even that, depending on the tasks for which they are used, they can improve organizational performance by 50 to 500% (Fernberg, 1985). It is not surprising then that one study of some fifty very large organizations shows that reducing costs was their main reason for purchasing information technologies (Curley and Pyburn, 1982).

There is, however, little empirical evidence (or at least little credible evidence) supporting or refuting claims regarding the effects of the introduction of AOIS in organizations (Stabell, 1982). In a review of more than 200 articles on this subject, Osborne and Rosenthal (1985) state that most reports published in this regard base their conclusions on the perceptions of managers and employees affected by the implementation of AOIS. All report productivity gains, but most are based on subjective assessments. There is thus strong anecdotal and circumstantial evidence that claims of improved productivity are true, but little reason to accept the specific percentages claimed. As Reed so colourfully puts it:

In fact, white collar professional productivity that can be tied directly to the implementation of technology is like the Loch Ness Monster: Almost everybody has heard about it; some claim to have seen it; but nobody has captured it (Reed, 1988, p. 47).

c) Physical environment

In the late 70s, the Buffalo Organization for Social and Technological Innovation Inc (BOSTI) conducted the largest study ever to determine the effects of the physical work environment on productivity and the quality of life in organizations (Brill, 1984). This study focused on the 18 aspects mentioned earlier as being characteristic of the physical environment,

grouping them into four broad categories: work space, ambient conditions, psycho-physical factors and facility design and management.

The six-year study involved a sample of over 6,000 white-collar workers (including managers, administrators, professionals, technicians and support staff) in 70 US public- and private-sector organizations. It involved measuring their ease of communication, degree of satisfaction with their jobs and their work environment and level of productivity both a few months and about one year after their physical environment was changed. Productivity levels were assessed using subjective criteria, ie, self-appraisal and supervisory appraisal, aimed at determining the quantity and quality of goods or services produced by the workers in question.

The results obtained show that almost all the aspects studied contribute to individual satisfaction with the work environment, that about half of these aspects affect employees' ease of communication and job satisfaction, but that only two of these aspects contribute directly to productivity, ie, enclosure (physical barriers between employees) and layout (the physical arrangement of furniture and walls within the work space).

Besides this large-scale study, few others have looked at the effects of the environment on organizational performance. One such study would appear to confirm that workers' satisfaction with their environment is related to their perception of the environment and particularly to the work space surface (Marrans and Spreckelmeyer, 1986). Others indicate that reducing screen glare (Springer, 1989) or providing more functional and comfortable offices would seem to increase worker productivity, thereby helping to amortize the cost of purchasing equipment over less than one year (Dressel and Francis, 1987). Still others point out the effects on absenteeism of working for long periods on a computer screen, and the subsequent effects of changes made by ergonomists on the productivity of the workers concerned (Schneider, 1985). There does not, however, seem to be any correlation between the time spent in front of a screen and the absenteeism rates of workers with greater skills and subject to more stringent controls (Aronsson, 1989). Another study shows that the layout of university chemistry laboratories helps them to attract and keep highquality staff (Becker, 1989). Finally, other studies show that open work areas contribute to worker discomfort (Ahlin, 1989) and to negative attitudes regarding their work conditions (Hedge, 1986). Accordingly, it would seem that productivity is higher among workers in conventional offices (Hedge, 1986). Some of these studies, however, are based on small samples which were not selected at random (Dressel and Francis, 1987; Hedge, 1986). Others fail to explain the methodology used to obtain the results described (Schneider, 1985; Springer, 1989), or else are based on subjective assessments (Hedge, 1986).

One study, conducted by Dr Arthur Rubin of the National Bureau of Standards and funded by the General Services Administration (the largest office design management firm in the world) confirms that very few studies have been conducted on the relationship between environment and performance (Wilson, 1988). Based on a review of the literature compiled in the data bases of 15 National Bureau of Standards offices, and on the analysis of 550 of these publications, along with interviews with numerous productivity researchers, its author states that the few researchers who have looked into this relationship have drawn questionable conclusions from subjective information.

Not only have researchers failed to pay much attention to this relationship, but workers themselves also do not seem terribly concerned with it. One study, conducted by Louis Harris and Associates, one of the major public opinion analysis firms in the US, shows that architects and furniture designers see a much closer relationship between work environment and performance than do company managers and other employees (MacFarlane, 1979). The results of a study conducted by Harris and Etzioni (1981), summarized in Table III (p 19), confirm that industry managers and public-sector employees do not feel that a more pleasant physical environment would greatly improve their productivity.

Moreover, these two studies, along with another more recent one conducted by the same firm (Steelcase, 1989), show that, consistently, more than two-thirds of workers are satisfied with their work space. Perhaps that explains why they do not feel that improvements in their environment could substantially improve their productivity.

d) Synthesis and conclusion

If one were to judge by the results of the studies described above, it would appear that technology and certain aspects of the physical environment are the only factors capable of significantly affecting organizational performance, and this conclusion is based on subjective assessments in most cases. To adequately evaluate these results, however, some considerations must be taken into account. In the first place, very few studies have focused on the effects of factors related to context on organizational performance, which means that no one can claim to really know these effects. Secondly, the systems and tools for measuring organizational performance are still in their infancy (American Productivity Center, 1982). This might explain why so few studies have tried to show the effects of certain factors on organizational performance, and also why the results obtained, most of them based on subjective evaluations, are so questionable.

Moreover, studies dealing specifically with the physical environment seem to show that many different aspects of that environment affect worker satisfaction with their jobs. Dissatisfaction with one's job has a number of undesirable consequences, such as higher absenteeism and turnover (Locke, 1983; Schneider, 1984). Such consequences are detrimental not only to the quality of work life in organizations, but also to organizational performance in general, since they tend to increase costs (Wineman, 1986). Accordingly, the potential effects of factors related to context on organizational performance, whether they concern work conditions, technology or the physical environment, should not be ignored.

## 1.2.2 <u>Concerning factors related to individuals</u>

Reporting on the highlights of the American Management Association's 57th Annual Human Resources Conference, Levine stated that: "the emphasis throughout was people; the way to make organizations work, speaker after speaker said, was by paying attention to the needs of people" (1986, p. 19). This opinion is shared by the authors of all the models explaining organizational performance presented in the first section of this chapter, as well as by most other authors consulted on this subject. However, other than the modelists, few authors specify which of the many factors related to individuals are capable of influencing organizational performance.

Becker and Neuhauser (1975) subdivide all of these factors into six subgroups relating respectively to individuals' abilities, their physical and mental health, their individual needs, the informal organization or the work group, the time period and, finally, certain aspects of the organizational structure. Table III (p 25) presents the various factors considered by these authors within each of these subgroups, and shows their consequent effects on employee satisfaction and motivation, and subsequently on employee job performance and organizational performance.

In presenting the results of studies into factors related to individuals, we will deal with only three of these subgroups: abilities, health and the work group. We have considered the time period along with factors related to things, and the structure of work groups with factors related to procedures, under the general heading of organizational structure. Moreover, factors related to individual needs are generally covered in studies on employee satisfaction or job motivation. We will thus combine our study of this aspect with these other two factors, which will complete our review of the effects of factors related to individuals on organizational performance.

#### a) Abilities

It will be remembered that, along with motivation, abilities are one of the two central variables in the organizational performance model developed by Cummings and Schwab (1973), but that their model has never been empirically tested. Two respected researchers, Solow and Fitz-Enz, support their model, however.

Robert M Solow, an economics professor at the Massachusetts Institute of Technology, won the Nobel Prize for Economics in 1987. In a speech at the sixth world congress on productivity, he said that there is no doubt that productivity growth in North American economies is primarily a question of abilities, attitudes and personal decisions (Durivage, 1988, pD1).

Fitz-Enz is president of the Sarasota Institute, an organization that performs studies and consults in the human resources field. In 1978, that organization began a longitudinal study of the critical factors accounting for human productivity. The study, which extended over a six-year period, looked at 94 companies and more than 4,000 employees. It identified 150 variables associated with human productivity. On the basis of factor analyses, these variables were classified under five factor headings accounting for 70 to 90% of the productivity of the employees studied. In 90% of cases where productivity was high, at least four of these five factors were present. They are: self-esteem, responsibility, co-worker relationships within work groups, employee capability (knowledge, skills, education, experience, specific training) and the availability of resources. The results of this study were confirmed through a series of interviews and analyses of productivity and quality experiments in white-collar settings. Note that the first four of these factors concern individuals, and the fourth relates specifically to their abilities (Fitz-Enz, 1986a).

#### b) Health

Among the factors related to individual health, Becker and Neuhauser (1975) list fatigue, safety, physical strength, illness, disability, alcoholism, etc. Only two other authors have dealt with these aspects, but no empirical studies have confirmed their effects on performance. Fitz-Enz (1986a) points out the importance of spending a great deal of time studying the personal situation of individuals and identifying their problems, thus referring to their mental health. McClelland (1986), a management expert, sees the way in which workers see themselves and how that affects their behaviour as one of the three elements with the most influence on human performance. He mentions anxiety, phobias and depression as factors inhibiting performance.

c) The work group

Three researchers have concentrated on the relationship between the work group and organizational performance. We described their models above, ie, those of Likert (1961, 1967) and Van de Ven and Ferry (1976, 1980). For Van de Ven and Ferry, the key variables for this factor are the circulation of resources and information within the work group. Likert refers to individuals' confidence in their colleagues, their sharing of information, their desire to reach common goals, their knowledge of the tasks to be performed as part of their work, and their ability to respond to unusual requirements, to plan and co-ordinate their efforts, to make proper decisions and to solve problems as they arise.

In addition to these researchers, a few others have focused on the effects of variables related to the work group on organizational performance, generally from the same standpoint as Likert, rather than from that of Van de Ven and Ferry. It will be remembered that, following his longitudinal study, Fitz-Enz (1986a) mentioned co-worker relationships as one of the five factors accounting for 70 to 90% of individual productivity. Moreover, based on a management and administration literature review, Gummer (1985) states that the authors identify competition and self-interest as two of the causes of the current low productivity of American workers. English and Marchione further develop this point by stating that:

Productivity improvement doesn't mean just working harder, but is a matter of how people work together. Management's efforts must be directed at creating a work environment that fosters co-operation, mutual trust, and commitment, and is based upon a partnership of integrated interest (1983, p. 63).

Other authors (Peters and Austin, 1985; Peters and Waterman, 1983; Sink, 1974) make similar observations.

Gregerman (1981) notes that knowledge worker productivity is affected by three groups of variables arising from the external environment, the internal environment and the peer group. The last group of variables serves as a buffer, making it possible to overcome the negative influences of the other two. Interactions in the peer group can also attenuate the detrimental effects of inadequate organizational policies. "In other words, camaraderie among knowledge workers helps to keep productivity high and to deflect hostile influences" (p 17).

#### d) Motivation

Most of the authors consulted see motivation as having a major influence on individual performance and thus on organizational performance. We saw earlier that, with the exception of Van de Ven and Ferry (1980), it is one of the central factors in the theories of all the researchers whose models we have included here. For Likert (1961, 1967), Litwin and Stringer (1968) and Cummings and Schwab (1973), motivation is an intermediate variable between an organization's management methods and its performance. For Hackman and Oldham, motivation, along with organizational efficiency, is a dependent variable, resulting from the core job characteristics and the critical psychological states they create. For Becker and Neuhauser (1975), motivation is an intervening variable between the formal organization, the members of that organization and their performance. In addition to these researchers, many others have focused on motivation, primarily with a view to defining or identifying its intrinsic or extrinsic determinants. We will summarize below the main results of their work.

### Definition

Simply stated, motivation can be seen as a force, impulse or internal intention compelling a person to do something or act in a certain way (Sink, 1985). Campbell and Pritchard (1983), in their critical analysis of the literature on motivation theory in industrial and organizational psychology, offer a more complex definition of motivation as resulting from the combination of the following factors: aptitude level skill - level a understanding of the task - choice to expend an effort - choice of degree of effort to expend - choice to persist - facilitating and inhibiting conditions not under the control of the individual. According to this definition, the choices to expend an effort, of the degree of effort to expend and to persist are in turn determined by intrinsic factors (aptitude level, skill level and understanding of the task) and extrinsic factors (facilitating and inhibiting and inhibiting conditions not under the control of the individual).

Litwin and Stringer (1968) draw a very important distinction between the fact of being motivated, which is a relatively stable personality trait, and aroused motivation, which is a tendency for action influenced by the situation. This distinction seems to meet at present with unanimous approval since, in the opinion of Schneider (1984), it is the most important contribution made by industrial and organizational psychology to the concept of motivation. The problem thus no longer lies in determining whether workers are motivated, but rather how organizations should be managed in order to activate it and direct their members' motivation toward appropriate behaviour and outcomes, in short, to act on the intrinsic and extrinsic determinants of motivation.

## Determinants

In responding to this question, a number of theorists have concentrated on the first set of determinants (aptitude level, skill level and understanding of the task) recommending, for instance, better employee selection and training (Cummings and Schwab, 1973). Most, however, have focused on the second set (facilitating and inhibiting conditions), suggesting changes to the job (Hackman and Oldham, 1975, 1980), leadership styles (Peters and Waterman, 1983; Peters and Austin, 1985) company management (Likert, 1961, 1967), the organizational climate (Litwin and Stringer, 1968), or the overall organizational environment (Richardson, 1980).

For his part, Vroom (1964) postulates that the differences in individual levels of performance are attributable to differences in: 1) the degree of desirability of the outcomes of the actions to be taken; 2) the assessment of the level of effort required to attain those outcomes; and 3) perceptions regarding one's ability to perform in the way required to attain those outcomes. Thousands of studies have dealt with different versions of this theory. Their results suggest that the differences noted with respect to each of these three aspects do not make it possible to precisely predict differences in individual levels of performance. They do, however, make it possible to predict certain choices made by individuals (choice of one job over another or to change jobs, etc). The results of these studies also suggest that the desirability of the outcomes is not always as important in the decision to behave in a certain way as are individual perceptions regarding the ability to produce such behaviour and to attain the desired results (Schneider, 1984). These results show that individuals' abilities and their perceptions of their abilities (self-esteem) determine the effort made.

## e) Satisfaction

With the exception of Becker and Neuhauser (1975), none of the authors whose models are described above mention employee satisfaction as a factor capable of affecting organizational performance. Most of the authors consulted do, however, see a relationship between these two variables. Before specifying the nature of this relationship, we will define satisfaction and present the results of studies aimed at identifying its determinants.

## Definition

Instead of the term "satisfaction", Becker and Neuhauser use the term "morale". These two concepts are often linked but seldom defined. According to Van de Ven (1976), the second concept

reflects the maintenance of a social system within the organization, and is generally described in terms of levels of satisfaction, turnover and absenteeism. Price defines the first concept as "the degree to which the members of a social system have a positive affective orientation toward membership in the system" (1972, p. 156).

Studies conducted on this concept in the early 1950s led researchers to conclude that it was a characteristic composed of five independent dimensions, ie:

- 1) satisfaction with economic and related rewards;
- 2) satisfaction with the adequacy of immediate supervision;
- 3) satisfaction with the effectiveness of the organization as a system;
- 4) Satisfaction with the job itself;
- 5) Satisfaction with the compatibility of fellow employees. (Ash 1954, p. 359; see Taylor and Bowers, 1972, p. 75).

Studies begun in 1966 at the University of Michigan's Institute for Social Research showed that while it may be true that individual satisfaction is a multi-dimensional matter, inter-group satisfaction is a unitary characteristic (Taylor and Bowers, 1972).

## Determinants

Figure 5 shows the main links between job satisfaction and various antecedent and consequent variables identified in the course of numerous empirical studies conducted in this regard (Seashore and Taber, 1976). This figure shows that satisfaction is a function, on the one hand, of a whole set of environmental characteristics, ranging from characteristics of the macroeconomic and political environment to characteristics specific to the individual job and, on the other hand, of the characteristics of the individuals performing these jobs, ranging from stable characteristics to essentially transient states such as anxiety, anger and boredom.

Although few studies have dealt with the effects of economic, political and cultural factors on satisfaction, the results available in this regard suggest that they do influence job satisfaction. Its correlation with demographic variables, on the other hand, is widely recognized. Job satisfaction increases with age and level of schooling. While the correlations between these variables are weak in studies of large and diverse populations, they are often strong when combined with other variables. Sex as a variable seems to affect satisfaction only when combined with other demographic variables (Seashore and Taber, 1976). Figure 5 also shows that satisfaction is the result of complex interactions between these two main categories of variables, which can generate causal, correlational, contingency, interaction, feedback and other relationships. Studies aimed at identifying the respective effects of each of these categories of variables on job satisfaction indicate that approximately half of the variance in the results of such measures may be explained by a relatively small number of environmental conditions, and that the individual differences underlying these results are systematic and predictable. These results suggest that some conditions of work are so linked to universal human needs that subminimal gratification ensures dissatisfaction (Seashore, 1975).

There are four organizational conditions that are considered universally satisfying because they result in employee satisfaction regardless of race, age or sex. These universally satisfying conditions are as follows: 1) work that is mentally stimulating and physically undemanding; 2) equitable rewards tied to work performance (wages, promotion, etc); 3) work colleagues and supervisors who facilitate the attainment of these rewards and are competent and friendly; and 4) organizational policies that are relatively free of ambiguity and conflict, and promote the attainment of rewards (Locke, 1983).

Research conducted by Morse (1977) makes it possible to identify certain specific determinants of each of the five types of satisfaction listed above. The degree of satisfaction that an individual will derive from his work depends mainly on the level of skill required by the work. Some individuals, with fewer skills and lower growth needs, will be satisfied with more routine work, though, General rather than close supervision will increase the desire for not only a varied workload requiring expertise but also higher wages and status. The degree of satisfaction that an individual will gain from his wages and status depends on various factors, including experience, training, cultural expectations and economic needs. Satisfaction with one's work group is linked to a number of its attributes, including the amount of assistance readily offered by its members, the friendliness of their relations, the absence of productivity-inhibiting standards, and certain management practices, such as the supervisor's ability to establish empathetic relations with employees. Satisfaction with one's organization seems to depend largely on satisfaction with the content of one's work and with wages and status. Other factors also seem to influence satisfaction with the organization, among them the attitudes of one's friends and family toward it and working conditions within the organization. The organization's prestige increases employees' satisfaction early in their careers, but their satisfaction subsequently declines and then grows again with their years of service and rank within the organization. Finally, some organizational environments are more satisfying than others for some types of personalities. It follows that certain personality types will be more likely to choose certain work settings.





## Consequences

Figure 5 makes a distinction between the consequences of satisfaction that are most frequently measured at the individual, organization and social level. In contrast with the great deal of varied literature dealing with the causes of job satisfaction, there are very few theoretical or empirical data available on the consequences of such satisfaction. The data available at present suggest that there are many correlations between satisfaction and its consequences, but that these correlations are weak. Job satisfaction will thus have many consequences, but it will appear as a unique or even major factor of those consequences in only a few cases (Seashore and Taber, 1976).

It has nonetheless been very clear for over thirty years that satisfaction has no effect on individual job performance (Locke, 1983; Schneider, 1984). A number of authors have suggested that it would be better to consider the second a cause of the first rather than vice versa (Locke, 1983). In order for a high level of performance to give rise to a high level of satisfaction, two conditions would have to be met: 1) such performance would have to lead to the attainment of important job values, such as success, recognition, promotion or high earnings; and 2) these would have to not be attained at such a high cost as to undermine the pleasure of attainment (by resulting in extreme fatigue, for instance) or to negate other important values (such as family relationships) (Locke, 1983).

All the literature reviews show, however, that there is a positive relationship between turnover and satisfaction (Locke, 1983; Schneider, 1984). Satisfaction is also thought to have an effect on absenteeism, but study results are less clear in this regard. Moreover, it is seen to influence the quality of work performed by employees, their wellness, safety, the amount of waste caused, smoothness of organizational functioning and client satisfaction (Schneider, 1984). In short, when employees are satisfied with the content of their work, their wages, their status and the organization as a place to work, they are more positive toward their supervisors, more favourably disposed to the organization's policies and less eager to leave (Morse, 1977).

f) Synthesis and conclusion

The results of studies focusing on the factors considered above (abilities, health, work group, motivation and satisfaction) show that they are all capable of affecting organizational performance. Certain characteristics of the work group, specifically its ability to co-operate, will determine that performance and even affect job satisfaction. In addition, individual abilities and mental health will affect not only employee performance, but also job motivation, which is one of the key factors explaining individual performance. Such motivation is a relatively stable personality trait, but it will be aroused by personal and environmental factors. Any concerted action aimed at improving motivation must therefore take its various determinants into account. Although satisfaction has no significant effects on employee performance, but is rather the result of that performance, it is seen as having important repercussions on the quality of work life (turnover, absenteeism, well-being, security, harmony, etc) and, consequently, on organizational performance. On the one hand, the quality of work life is one indicator of organizational performance and, on the other, the negative consequences of dissatisfaction result in additional costs to the organization. A number of universally satisfying conditions (relating to the work itself, rewards, the work group and organizational policies) make it possible to avoid such consequences. Any evaluation of organizational performance must therefore take into account each of the factors mentioned above, along with the intrinsic and extrinsic determinants of motivation and satisfaction.

### 1.2.3 <u>Concerning factors related to procedures</u>

Becker and Neuhauser (1975) subdivide factors relating to procedures into four groups referring respectively to management techniques, leadership styles and climate, personnel management policies and organizational structure (Table III, p25). They consider that this set of factors acts on employee satisfaction and motivation and thereby determine their job performance. We will present below the results of research conducted to identify the effects of each of these groups of factors. We have, however, subdivided those factors relating to leadership styles and climate into two separate groups, and have also added the notion of culture, which succeeded climate, to that concept.

#### a) Managerial techniques

Managerial "techniques", as defined by Becker and Neuhauser (1975) in their listing of the related variables, differ from the management "styles" described by Likert (1961, 1967). Becker and Neuhauser (1975) are primarily concerned with administrative techniques (budget control, wage administration mechanisms, planning, forecasting, marketing, etc), while Likert (1961, 1967) focuses on managerial techniques as such (decision-making, goal-setting and planning, control processes, etc). There is a certain amount of overlap between these two classifications, however, particularly with regard to communications and management skills.

Among the factors seen by Becker and Neuhauser (1975) as relating to managerial techniques (with the exception of information systems, which we dealt with under factors related to things, and organizational prestige, which we mentioned under effects on satisfaction), only two have been studied by the authors consulted, ie, communications and management skills. These studies, which are presented below, thus focus on organizational managerial rather than administrative techniques.

## Communications

Communication is described by Price as "the degree to which information is transmitted among the members of a social system" (1972, p. 58). Four studies focus on this factor; one of them looks at the importance of communications for employees, two others assess their effects on individual performance, and the last one determines their effects on organizational performance.

A recent survey of US and Canadian workers shows that over 75% of the 1,031 US respondents think it very important for managers to encourage an open exchange of information between employees and between the departments in their organizations (Steelcase, 1988). For respondents, this is one of the three most important aspects of their work situation. No exact figures are available for the Canadian sample, but they are not apt to be significantly different from the American sample (Steelcase, 1988).

According to the authors of the management and administration literature surveyed by Gummer (1985), limited information-sharing and communications within organizations can explain in part the low productivity of American workers. The results of Fitz-Enz's research (1986a) confirm this finding, identifying co-worker relationships as one of the five factors explaining 70 to 90% of the performance of the individuals evaluated. His research also led him to conclude that: 1) the immediate supervisor is the most preferred source of information; 2) on the topics of greatest personal interest, workers prefer face-to-face meetings with the immediate supervisor; and 3) most employees trust their immediate supervisor more than senior management (Fitz-Enz, 1986b).

Snyder and Morris (1984) looked at the effects of three levels of communication (macroorganizational, between peers and with the supervisor) on the performance of 12 social service agencies. The results obtained show that two variables related to communication, ie, the supervisor's communication skills and the exchange of information within the work group, are closely linked to two aspects of the performance of the organizations studied: productivity (ie, number of clients served per employee) and profitability (ie, operating costs).

The results of the various studies conducted into communications indicate not only that workers want open communications within the organization, but also that communications, particularly within the work group, are capable of affecting organizational performance.

### Managerial skills

As noted earlier, Likert (1961, 1967) and Litwin and Stringer (1968) see managers' leadership skills as being important factors in organizational performance. A number of studies mentioned above indicate that managers' communications skills affect the performance of their employees and of their organizations. The results of Fitz-Enz's research (1986b) would seem to confirm this finding, in that they show that firms that are the most successful at improving their performance are those whose managers at all levels remain visible, accessible and physically in touch with their employees.

b) Leadership styles

In 1966, a team of researchers under the direction of Likert launched a longitudinal study, the primary goal of which was to produce a questionnaire designed to assess certain critical factors explaining organizational performance, focusing mainly on leadership styles and climate. The questionnaire was based on a meta-theory of organizational functioning, incorporating all the pertinent knowledge acquired in this regard (Taylor and Bowers, 1972).

The leadership data represent the results of much of the work done at the University of Michigan and Ohio State University concerning the leadership construct and its effects on organizational performance. These data indicate that: 1) the leadership construct comprises four dimensions: support, goal emphasis, work facilitation and interaction; 2) these four dimensions apply equally to the activities of group members and to the activities of the group's designated leader; and 3) these two parallel structures, each including four identical dimensions, influence organizational performance (Taylor and Bowers, 1972).

More recent literature stresses the importance of a participatory leadership style. According to Peters and Waterman (1983), the best-managed companies in the United States demonstrate effective leadership by delegating authority and promoting autonomy and entrepreneurship. A number of management and administration experts consider that autocratic management and the submission it engenders, along with unnecessary controls that inhibit initiative and creativity, are partially responsible for the decline in American productivity (Gummer, 1985). Moreover, although studies focusing on the value of different motivation-enhancement techniques indicate that encouraging employee participation in their organization's decision-making is the least effective way of motivating them, surveys of US and Canadian workers tend to show that they want a say in decisions affecting their work life. According to one Gallup poll, 84% of respondents think that they would work harder and produce better work if they were involved in decisions concerning their work (Scott, 1981). Another study shows that, in both Canada and the United States, over 60% of respondents consider a participatory management style important at all levels in the organization. More than three-quarters of respondents also think it very important that they be given a great deal of freedom in making decisions regarding the way in which their work is performed (Steelcase, 1988). These results are in fact similar to those obtained by the same firm in earlier polls (Harris, 1978; Harris and Etzioni, 1981).

A leadership style encouraging support, participation and autonomy, facilitating the work and interactions, and emphasizing the goals to be met should thus be capable of contributing, on the one hand, to organizational performance and, on the other, to the satisfaction of its members and thus to the quality of their work life.

### c) Climate

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Two research groups have focused particularly on the effects of organizational climate on organizational performance: Litwin and Stringer (1968) and the Likert team at the University of Michigan (Taylor and Bowers, 1972). The latter group pursued the work conducted by Likert on management styles, but in this case considered them from the point of view of the members of the organization, ie, with respect to their effect on the organizational climate.

These two research groups define the concept in the same way: "organizational climate is a multi-dimensional perception of the essential attributes or character of an organizational system" (Tagiuri and Litwin, 1968, p. 110; see Taylor and Bowers, 1972, p. 62). The attributes or characteristics they list as being capable of creating such a perception also coincide. Litwin and Stringer see it primarily as being the leadership style adopted by the organization. The Likert team sees it as the organization's processes of communication, motivation, decision-making, control, inter-departmental co-ordination and general management - in short, its management or leadership styles. Like Litwin and Stringer, this team postulates that climate acts as an intermediate variable between the management or leadership styles of organizations and their performance.

There are unfortunately no studies available to confirm this theory. We do know, however, that it has a solid empirical basis since, as we mentioned earlier, the studies conducted by the Likert team were based on a meta-theory of organizational behaviour, incorporating all the pertinent knowledge acquired in this regard.

#### d) Culture

The notion of organizational climate is somewhat similar to the more recent concept of organizational culture. The publication in 1980 in Business Week of an article on corporate culture brought this new term into the language and generated considerable interest and numerous other articles. In the opinion of Allaire and Firsirotu (1983a), however, the same message has been transmitted by organizational theorists for the past 50 years. The cultural metaphor is thus not a new one.

For Allaire and Firsirotu, culture corresponds to a system of meanings that enables the members of an organization to interpret their experience and to structure the particular reality of their organization (1983b, p. 484). Lemaître describes it similarly, saying that it is a system of representations and of values shared by all the members of a firm (1984, p. 81). She also says that culture has two important effects: 1) it prompts action: it mobilizes energies and focuses them on a few major goals; and 2) it directs: it channels behaviour around a certain number of standards for action. Because of these characteristics, culture is capable of having significant effects on performance.

The results of studies by Peters and Waterman (1983) would appear to confirm this, since in their opinion, the most successful companies foster a climate where there is dedication to the central values of the company, combined with tolerance for all employees who accept those values. Other organizational assessment and management experts also consider the existence and acceptance of a common goal essential to organizational performance (Sink, 1983; Stankard, 1986).

Fitz-Enz (1985b) states that there are two ways of improving organizational performance: 1) improving the way certain tasks or processes are carried out; and 2) changing corporate culture. The latter approach presumes that by restructuring systems and processes, a new work environment is created; it thus requires much greater and more sustained effort than the former. The results of Fitz-Enz's research show that firms that are most successful at improving their performance are those in which top managers become personally involved in changing the corporate culture, thereby serving as role models for the other employees. Management consultants also suggest changing corporate culture as the main means of improving organizational performance (Berglind, 1987; Berglind and Scales, 1987; Townsend, 1985).

e) Personnel management policies

Among the personnel management policies capable of affecting organizational performance, Becker and Neuhauser (1975) mention the following: job content, selection, screening and placement procedures, introduction to the job, work standards, salary and wage levels, fringe benefits, incentives, performance rating, training programs and the job.

It will be remembered that personnel management policies are one of the central factors in the Becker and Neuhauser model (1975), and that Likert (1961, 1967) sees, more specifically, personnel training policies as being one of the elements of organizations' management styles affecting their performance. We also noted earlier that wages and fringe benefits affect worker satisfaction with respect to these aspects.

The other studies reviewed in this regard focus on only three of the factors listed by Becker and Neuhauser, ie, the job, performance rating and incentives. A number of authors do mention the processes by which work is performed as a factor affecting organizational performance. The results of the research reported below are thus concerned with each of these four factors.

## The job

Apart from the work of Hackman and Oldham (1975, 1980) we found only one empirical study on the effects of job characteristics on employee performance and motivation (Batson and Miller, 1985). These authors report the results of an exhaustive literature review and a study conducted over a four-year period that surveyed 2,350 managers and technical personnel in 50 organizations. The results of their research show that in addition to motivation and management styles, the job itself is an important factor affecting individual performance. The table on the following page lists the practices considered effective in that regard.

### Tableau VI

#### Factors identified by Batson and Miller study participants as enchancing performance 1

- 1. Provide assignments that lead, through successful completion, to a feeling of accomplishment and a sense of contributing/belonging.
- 2. Ensure assignments are pertinent to the organization's overall objectives and have management's active interest and support.
- 3. Assign work in keeping with individual capabilities and interests avoid misemployment don't get employees "in over their heads".
- 4. Ensure assignments make effective use of employees' existing skills and talents while, at the same time, affording them an opportunity to develop new skills and grow.
- 5. Keep assignments in scope avoid too many simultaneous tasks.
- 6. Keep assignments from being overspecialized jobs should not be divided too finely.
- 7. Ensure assignments are clearly defined and involve specific responsibility; avoid open-ended assignments whenever possible.
- 8. Focus on end results (technical performance, costs, schedules, etc.), giving the employee as much freedom and opportunity for work-planning and decision-making as possible.
- 9. Make schedules tight but realistic; permit adequate time to do the job effectively.
- 10. Provide employees with the necessary resources to do the job effectively.
- 11. Use the most capable people for the most critical jobs. (This does not mean continually using the same tried and proven employees; capable but untried people must be given a chance this is the only way junior employees can develop).
- 12. Provide particularly creative people with highly challenging job assignments, minimizing boring, repetitive and trivial tasks.
- 13. Minimize the amount of nonengineering work done by engineers.
- Strive for equity or workload among employees; don't overload good people just because they "always come through".
- 15. Consider special assignments for key people in addition to their primary responsibilities; e.g., identify them as consultants in specialized areas in addition to their normal work.
- 16. Change or expand employee assignments periodically; don't destroy capable people by trapping them in "indispensable" functions that lead nowhere.
- 17. Minimize loans of employees to other organizations this is usually an unsatisfying arrangement for the employee.
- Establish work teams of people who are particularly productive when working together. (Selection of personnel whose backgrounds differ widely often enchances cross-fertilization of ideas and has a synergistic effect).
- 19. Maintain an adequate backlog of work. The productivity of people waiting for new assignments is usually relatively low, and existing projects tend to overrun if there are no new assignments in sight.
- 20. Provide job security consistent with the employee's job performance.
- 4.8 1. Adapted from Batson and Miller (1985)

A number of other authors emphasize the importance of the job as a factor. According to the authors of the literature reviewed by Gummer (1985), jobs designed solely in terms of technology and not of human ability are in part to blame for low American productivity. According to Taylor (1977), the main objective of job redesign is not to transform jobs, but rather, to change the rules. It results in the creation of work groups organized around entire jobs, instead of being fragmented. Such changes improve both the quality of work life and organizational performance. They also give rise to major structural changes. Etzioni (1980) considers the pairing of workers with their jobs more important than education levels, and also feels that job restructuring will have better results than attempts to change workers' personalities. Sims *et al* (1976) consider that more attention should be paid to job characteristics, not only because they can affect worker satisfaction and performance, but also because they change supervisors' behaviour toward their employees. For McClelland (1986), the job, the environment and the way in which workers see themselves are the three most important factors affecting human performance. Fitz-Enz (1986b) states that changing the job or job processes is one of the two main ways of improving organizational performance, with the other approach involving changes in corporate culture.

## Processes

The term "process" refers, on the one hand, to the methods and procedures used to accomplish work activities and, on the other, to the mechanisms by means of which these activities are linked together in order to produce the goods or services required (Berglind and Scales, 1987). This factor is generally mentioned in the description of organizational performance enhancement programs as one of the key steps in such programs (Berglind, 1987; Berglind and Scales, 1987; Bolte, 1983-1984; Hamann, 1986; Lewis, 1984). These authors also suggest two ways of changing this factor: 1)eliminating everything that is not essential to the work activities; and 2) simplifying the essential. It is argued that the processes used by white-collar workers are generally less well documented and explained than are those of blue-collar workers and, accordingly, any attempt to improve their productivity must change their work processes. Moreover, such change is a pre-requisite to the introduction of AOIS. According to Thor (1989), chairman of the American Productivity and Quality Center, it is possible to greatly improve the work processes of white-collar workers, and the effects of such changes on organizational performance greatly surpass those of cost-cutting measures.

## **Performance** evaluation

Like Cummings and Schwab (1973), many authors consider the evaluation of individual performance one of the key means of improving such performance (Berglind and Scales, 1987; Bolte, 1983-1984; Brisley and Fielder, 1983; Denton, 1985; Fitz-Enz, 1986a; Greenwood and Greenwood, 1984; Hamann, 1986; Lewis, 1984; Rowe,1981). This can be explained by the fact that performance evaluation helps to motivate employees, especially if they are informed of the results obtained (Thor, 1989). To those who would claim that white-collar workers are resistant to such measures, Thor (1989) replies that bonus programs for middle and senior managers are generally based on an evaluation of their performance, which is most often measured in terms of their contribution to the overall performance of the organization, and that managers are rarely opposed to the establishment of such programs.

## Incentives

In a large study, Locke *et al* (1980) attempted to identify the respective advantages of the four most commonly used motivation techniques in the US (monetary rewards, management by objectives, employee participation in decisions that concern them and job enrichment). They synthesized the results of 56 studies aimed at determining the effects of these techniques on individual performance. Table VII summarizes the results of this research, indicating the median improvement and the range of improvement obtained using each of these techniques, along with the percentage of studies in which they gave rise to improvement of more than 10%.

According to the table, monetary rewards and management by objectives have considerably greater motivating potential than employee participation in decisions and job enrichment. Contrary to the other three motivation techniques evaluated, participation may take various forms, however. The Locke *et al* research was limited to studies focusing on participation in decision-making. They excluded various other forms of participation, such as Likert's system 4 applications and quality circles, because their effects overlapped with those of other, concurrent, motivation enhancement techniques.

#### Table VII

Summary of 56 studies comparing the effects of four motivation techniques on employee performance<sup>1</sup>

Technique	n (56)	Amélioration médiane	% manifestant de l'amélioration	% manifestant 10 % ou + d'amélioration	Ètendue
Récompenses financières	10	+30 %	100 %	90 %	de +3 % à 49 %
Gestion par objectifs	17	+16 %	100 %	94 %	de +2 % à 57,5 %
Enrichissement des tâches	13	+17 %	92 %	61 %	de -1 % à +63 %
Participation aux décisions	16	+0,5 %	50 %	25 %	de -24 % à +47 %

1. Adapted from Locke et al. (1980)

Thus, it would be incorrect to conclude that employee participation by means of such approaches has no significant effect on their motivation. In view of the fact that the maturity and expectations of workers in the United States and other industrialized countries are increasing rapidly, Sink (1985) considers instead that their systematic and structured participation in the management of their work environment is a necessary but in itself insufficient element in any program aimed at improving organizational performance. He feels that this approach will facilitate the introduction of other performance enhancement techniques and increase the probability of their achieving their goals in an efficient and effective manner.

Despite the results reported by Locke *et al* (1983), there are conflicting opinions regarding the value of monetary rewards (Fitz-Enz, 1986b). The authors of the literature reviewed by Gummer (1985) believe that reward systems that encourage competition and personal interest have detrimental effects on performance. Drucker (1954) feels that it is workers' sense of responsibility that feeds their intrinsic motivation to perform. And money cannot buy that sense of responsibility. It motivates only where other things have made workers ready to assume their responsibilities. Satisfaction with incentive pay is not sufficient motivation to perform; incentive pay produces better output only where there is a willingness to perform better. Otherwise it is ineffectual, indeed, sabotaged.

Such conflicting views aside, authors, and particularly those in favour of performance enhancement and evaluation programs, agree that some form of recognition is necessary. For, as noted by Fitz-Enz (1986b), when new behaviour is not managed and rewarded, it slowly regresses to the old, more familiar routines.

### f) Structure

It is generally believed that an organization's structure affects the behaviour of its members, this belief being based on simple observation or simple common sense (Hall, 1977). It is therefore not surprising that, with the exception of Hackman and Oldham (1975, 1980), all the theorists whose models are described above mention this factor as one of the main determinants of organizational performance. Among these theorists, however, only Van de Ven and Ferry (1980), give it a central role in their model. In so doing, they align themselves with the contingency approach, which is specifically devoted to the study of relationships between organizational structure and performance. To shed some light on these relationships, we will first define organizational structure and then summarize the results of research specifically aimed at defining these relationships. Finally, we will describe the contingency approach and discuss its contribution to identifying these relationships.

## Definitions

The term "structure" encompasses a variety of concepts, grouped together by Dalton *et al* (1980) into two categories: structural dimensions and structuring dimensions. Structural dimensions correspond to the organization's physical characteristics, while structuring dimensions refer to the policies and activities within the organization that prescribe or restrict the behaviour of its members. The definitions below of the various aspects of each of these dimensions are drawn

from the work of the following authors: Fry and Slocum (1984), Miller (1983), Price (1972) and primarily Dalton*et al* (1980). The way in which they define the various aspects of organizational structure may vary slightly, but most often the distinctions lie more in how loosely or narrowly the terms are defined, rather than in the way in which they are understood. We have chosen to combine these various definitions, except where they diverge.

## Structural dimensions

The structural dimensions referred to most frequently in the literature are as follows: size of the organization and its subunits, span of control, flat/tall hierarchy and administrative intensity.

## Size

Size refers to the scale of the organization's operations. It may be measured in terms of the number of employees, sales or degree of expenditures.

## Span of control

Span of control refers to the number of subordinates who report directly to one supervisor.

## Flat/tall hierarchy

Flat/tall hierarchy refers to the number of hierarchical levels in an organization. This dimension and that of span of control are closely linked. With a given number of employees, relatively tall structures (many hierarchical levels) must necessarily have a narrower span of control. Inversely, a relatively flat structure (few hierarchical levels) would necessarily have a wider span of control.

## Administrative intensity

The members of a social system may be subdivided into two groups: 1) those who mainly perform activities that directly contribute to the system's primary output; and 2) those who mainly perform activities that contribute only indirectly to the system's primary output. The former are called production staff and the latter, administrative staff. Administrative intensity is defined as the number of administrative staff (full-time, permanent members of the organization) divided by the number of production workers.

# Structuring dimensions

The structuring dimensions referred to most frequently in the literature are: specialization/complexity, formalization/standardization and centralization.

## Specialization/complexity

Specialization and complexity refer to similar concepts. Specialization may be defined as the number of different occupational titles or different functional activities pursued within an organization, while complexity refers to the number of different occupational specialities within that organization.

## Formalization/standardization

Formalization and standardization are also closely related concepts, but the authors define them differently. Dalton *et al* (1980) define formalization as the extent to which appropriate behaviour is defined in writing, and standardization as the extent to which the procedures to be followed in achieving that behaviour are defined in writing. Thus, formalization indicates what is to be done and standardization, how to go about it. Fry and Slocum (1984) and Miller (1983) do not draw any distinction between formalization and standardization, and define the former as the existence of rules and procedures, coupled with the organization's exercise of control to enforce these rules and procedures or the measure of the latitude of behaviour that is tolerated from standards.

## Centralization

Centralization refers to the dispersion of decision-making authority or the concentration of power in an organization. The maximum degree of centralization would exist if all power were exercised by a single member of the organization, while the minimum degree of centralization would exist if all power were exercised equally by all members of the organization.

## Research results

Although many recent articles and books have been written on organizational structure, its effects on organizational performance have generally been ignored. Most researchers have concentrated on the links between different structural and structuring aspects, and particularly their

effects on the attitudes (job satisfaction) and behaviour (absenteeism, turnover, accidents, labour disputes) of the members of these organizations. Since these various aspects are capable of affecting organizational performance, however, we will discuss the results of all of the research conducted in this regard, focusing in turn on each of the variables defined above.

#### Size

The conclusions of research into the effects of organizational size on other aspects of organizational structure are contradictory. There would appear to be growing agreement that larger organizations tend to be more specialized, formal and standardized than smaller organizations (Hall, 1972). Moreover, the size of an organization may be altered by its technology (Hall, 1972), ie, through the organizational transformation process of inputs and outputs. The smaller an organization, the greater the effects of technology on its structure (Payne and Puch, 1983). An organization's size is also thought to have important effects on its management style and its members. Greater size will create problems with respect to control, co-ordination and communication. It will give rise to stress, depersonalization and discomfort (Hall, 1972), job dissatisfaction, absenteeism, turnover, accidents and labour disputes (Porter *et al*, 1975). Size will also greatly influence perception of climate (Payne and Puch, 1983).

At the organization level, no clear, systematic relationship has been found between organization size and performance (Dalton *et al*, 1980), and a curvilinear relationship has been identified between size and productivity (Porter *et al*, 1975). At the unit, department or work group level, there is evidence of an inverse association both between size and performance (Dalton *et al*, 1980) and between organizational size and productivity (Porter *et al*, 1975). According to Dalton *et al*, 1980), the absence of a clear relationship between organizational size and performance may be explained, however, by the problems involved in measurement, since organizational size is defined differently in the different research studies (eg, number of beds in a hospital, number of full-time students in a school, etc).

#### Span of control

There has been little empirical study of span of control. There does not seem to be any relationship between span of control and organizational performance with respect to blue-collar workers. For white-collar workers, the research results are contradictory (Dalton *et al*, 1980).

## Flat/tall hierarchy

It is difficult to generalize the results of studies dealing with the relationship between the hierarchy of organizations and their performance, since the researchers concerned all used different samples and reported both positive and negative associations between these two variables (Dalton *et al*, 1980).

The management literature is very concerned with this factor, however. As early as 1954, Drucker noted:

the requirement that the organization structure contain the least possible number of management levels [since] every additional level makes the attainment of common direction and mutual understanding more difficult. Every additional level distorts objectives and misdirects attention. Every link in the chain sets up additional stresses, and creates one more source of inertia, friction and slack. Above all, especially in the big business, every additional level adds to the difficulty of developing tomorrow's managers, both by adding to the time it takes to come up from the bottom and by making specialists rather than managers out of the men moving up through the chain (p 203).

In 1983, Peters and Waterman confirmed the importance of this aspect, claiming that the lack of what they refer to as a "matrix" organization structure was one of the key features of the best managed companies in the United States. A review of the management and administration literature also shows that the authors of these reports identify top-heavy and unresponsive organization structure as one of the causes of low American productivity in recent years (Gummer, 1985).

#### Administrative intensity

The relationship between administrative intensity and performance remains undetermined, since some research results are positive and others negative (Dalton *et al*, 1980).

### Specialization/Complexity

Most of the results of studies into the relationship between specialization or complexity and performance suggest a negative association between these variables. Few empirical studies have dealt with this question, however, and many of them are based on subjective performance criteria

(perceptions, opinions and observations). Moreover, some studies show no association between the two variables. The association has not been clearly demonstrated (Dalton *et al*, 1980).

### Formalization/Standardization

It is generally believed that a minimum level of formalization and standardization is required within an organization to avoid role ambiguity, but that too much formalization and standardization may result in boredom, alienation, job dissatisfaction, absenteeism, staff turnover and low productivity. This suggests a curvilinear relationship between these two variables wherein there may be an optimal level of formalization/standardization that reduces role ambiguity yet maintains reasonable levels of job scope within an organization. Empirical research conducted at the subunit level, however, neither supports nor rejects this hypothesis. Moreover, none of these studies used hard performance criteria (measures of productivity, profitability, quality of goods and services produced, etc) (Dalton *et al*, 1980).

### Centralization

In both subunit and organization level analysis, the evidence supports a conclusion that centralization is negatively associated with performance (Dalton *et al*, 1980; Miller, 1983). However, most of the studies in this regard did not use hard performance criteria (Dalton*et al*, 1980). It would appear, however, that the more dependent organizations are on their environment for their survival, the more centralized their decision-making structure will be (Payne and Puch, 1983). It follows that more dependent organizations are likely to have poorer performance.

## **Contingency** approach

Schoonoven (1981) argues that contingency "theory" is not a theory at all, in the conventional sense of a theory as a well-developed set of interrelated propositions, but rather an approach to the phenomenon of differences between organizational structure and performance. Drawn primarily from large-scale empirical studies, this approach relies on a few assumptions that have been explicitly stated, and these guide contingency research. Two of these assumptions, adapted from Galbraith (1973), the leader in this field, are as follows: 1) there is no one best way to organize; and 2) any way of organizing is not equally effective under all conditions. In order to be most effective, organizational structures should be appropriate to the work performed and/or to the environmental conditions facing the organization.

This approach also suggests that a combination of variables related to organizational context and structure may be more closely related to performance than any one of these variables considered in isolation. However, most of the studies dealing with a "pattern" of structural variables do not consider performance a dependent variable. Others do not use hard performance criteria, thereby reducing their reliability. Finally, the few studies using hard performance criteria show that variations in organizational structure have little impact on performance levels (Child, 1977; Dalton *et al*, 1980; Fry and Slocum, 1984).

Nonetheless, this approach has transformed the way in which such variations are viewed, encouraging researchers to focus not on any one specific set of relational predictions concerning organizational structure and performance, but rather on the general concept that what makes a successful organization depends on what it seeks to accomplish and the conditions in which it operates.

After the long search for "the one best way to organize," this insight was hard to come by, but now that it has been won, the contingency approach seems so obviously correct that we are not likely to give it up easily (Scott, 1977, p. 90).

### Synthesis and conclusion

Dalton *et al* conclude that "the literature on structure-performance relationships is among the most vexing and ambiguous in the field of management and organizational behaviour" (1980, p 60). Moreover, not only is the literature inconsistent, but there is also a paucity of research in this regard. Few studies use hard measures of performance and they are all cross-sectional, whereas only longitudinal studies would allow for interpretations of causality in the linkages between structure, performance and other situational variables. These authors formulate a number of interesting hypotheses to explain the mixed and ambiguous associations reported in the literature: Perhaps there may be moderate variations in an organization's structure without affecting its performance. Large variations in organizational structure may perhaps be required before they affect its performance. This is perhaps the reason why studies in this regard have had such mixed and ambiguous results. This has perhaps discouraged research into this question.

All of the literature we have reviewed, however, does tend to show that three aspects of organizational structure are capable of negatively affecting performance, ie, size (at the unit, department and work group level, in particular), their degree of specialization/complexity and their degree of centralization. The literature on the effects of all other aspects of organizational structure

on performance remains contradictory. Several authors do, however, mention flat/tall hierarchy as a factor capable of affecting organizational performance. Following his review of the literature in this regard, Miller (1983) stated that some consensus about the most important structural variables (size, formalization and centralization) is emerging. Accordingly, while the literature on structureperformance relationships may be inconclusive, we believe that any study of organizational performance should at least include the five variables mentioned above, ie, size, specialization/complexity, centralization, flat/tall hierarchy and formalization/standardization. In light of what was said earlier, any such study should also be longitudinal and use hard performance criteria.

### g) Synthesis and conclusion

We have reported the results of research into six groups of factors related to the procedures used by organizations: their managerial techniques, leadership styles, climates, cultures, personnel management policies and structures. These results show that among the structural and structuring factors mentioned above, the following factors are capable of affecting organizational performance: communications within the work group and with the supervisor, management communication and leadership skills, leadership styles, organizational climate and culture, job design and job processes, performance evaluation systems and incentives.

The results of studies focusing on communications, management skills and leadership styles confirm the theories of Likert (1961, 1967), Litwin and Stringer (1968) and Peters and Austin (1985). In general, the results of studies concerned with personnel management policies confirm the Cummings and Schwab (1973) theory, and certain assumptions made by Likert (1967) and Litwin and Stringer (1968). In particular, the results of studies on job characteristics would appear to confirm the Hackman and Oldham (1975, 1980) theory, although those concerned with incentives show job enrichment to be one of the least effective means available. The results of studies on organizational structure confirm certain aspects of the theories of Van de Ven and Ferry (1980), Likert (1967) and Litwin and Stringer (1968), emphasizing the effects of organizational size, specialization, complexity and centralization on performance.

## **1.3** Organizational performance factors model

In this section, we will first synthesize all the theoretical and empirical factors capable of affecting organizational performance, based on the results of our literature review. We will then

produce a model explaining such performance, taking into account our synthesis and subsequent considerations.

## 1.3.1 Synthesis

According to the results of studies conducted by the modelists and other researchers whose work we have presented in this chapter, 14 main factors are capable of altering organizational performance:

- their managerial techniques
- . their leadership styles
- . their climate
- . their culture
- . their personnel management policies
- . their context
- . their structure
- . the skills of their members
- . the health of their members
- . their motivation
- . their group processes
- . technology
- . the physical environment
- . the quality of work life

Some of these factors act as independent variables and some as intermediate variables, while others influence only the satisfaction of the members of an organization, and yet others will result from its performance. Accordingly, managerial techniques, leadership styles and the structure of organizations will affect performance by having an impact on climate, culture, the motivation of members and group processes. Personnel management policies will alter organizational performance by affecting members' skills and motivation, which is in turn influenced by their skills. Job processes will affect organizational performance by altering structures and work group processes. Certain variables, including members' health, the organization's technology and some aspects of its physical environment will affect performance directly and not through intermediate variables. Work group processes, the physical environment and work conditions will also affect employee satisfaction with these aspects, which will not

directly influence organizational performance, but rather will affect client satisfaction and the quality of work life, itself a partial determinant of organizational performance.

The results of the studies presented throughout this chapter thus show, if only as is evidenced by the complexity of the previous paragraph, that it is impossible to link organizational performance with a single or even major cause, such as job characteristics or structure, to even to attribute it to certain specific causes such as leadership styles or climate. Rather, these studies show that a multitude of factors, the effects of which are all interrelated, are capable of affecting organizational performance. As is so judiciously noted by Hackman, influences on organizational performance do not come in separate, easily distinguishable packages, but rather are so entangled that it is difficult to straighten them out.

Indeed, to try to partial out and assess the causal effects of each piece of a multifaceted organizational change may lead to the conclusion that *nothing* is responsible for an observed improvement in productivity - each ingredient of the spicy stew loses its zest when studied separately from the others(1984, p. 214).

If we attempt to explain organizational performance by focusing on single causes or on only some of these causes, we are unlikely to generate a coherent understanding of the phenomenon, he adds; there are simply too many ways to get there from here, and the different routes do not necessarily have the same causes. Systems theorists call this equafinality, a principle according to which a social system can reach the same outcome from a variety of different conditions and by a variety of methods. Like this principle, the results of the various studies presented in this chapter encourage us to view organizational performance as essentially involving the creation of multiple conditions.

The best way to improve creativity, then might be to alter *several* factors all at once, to create a "critical mass" of favorable conditions, and to deliberately foster redundancy among positive features of the performance setting (Hackman, 1984, p. 215).

Moreover, if it is true that productivity is an overdetermined phenomenon, the product of multiple, nonindependent factors whose influence depends in part on the fact that they are redundant, we will have to find a different way of thinking about the causes of organizational performance. For instance, we will have to do away with the comfortable assumption that x is a cause of y, but their relationship is moderated by z. The contingency approach attempts to complicate this equation by adding ever more distinctions and conditions to general propositions. Unfortunately, the point of diminishing returns is reached soon: increments in explanatory power come more slowly than increases in model complexity. "It is time, I believe, for us to open

ourselves to the organizational forces that have tidal rather than ripple effects on productivity and to develop conceptual models that address such factors directly" (Hackman, 1984, p. 222). According to that author, it will be necessary to find ways of creating mutually beneficial partnerships, within which researchers and organization members will work together on common studies focusing on the factors affecting organizational performance.

### 1.3.2 <u>Model</u>

Table VIII presents the model resulting from our review of the literature concerning the factors affecting organizational performance and our subsequent thinking in this regard. The model reflects the results of the literature review, but does depart from them in some respects. It shows that some primary factors influence secondary factors, thereby affecting organizational performance and, subsequently, the satisfaction of their members and the quality of work life. It also indicates that these results will in turn affect performance, secondary factors and primary factors.

The primary factors influencing secondary factors include some related to the procedures used in organizations (management techniques, leadership styles, personnel management policies, context and structure), certain factors related to individuals (abilities and health) and all the factors related to context (technology, physical environment and work conditions). The secondary factors are organizational climate and culture, member motivation and group processes. We have included climate and culture as secondary factors related to procedures, and motivation and group processes as secondary factors related to individuals.

The results of our literature review indicate that all the factors related to procedures are capable of influencing organizational climate and culture, along with member motivation and group processes. They also show that employees' abilities affect their motivation. They do not demonstrate, however, that employees' health or all the factors related to context affect secondary factors. We do believe, nonetheless, that individual health, technology, the physical environment and work conditions in organizations are also capable of influencing these factors. Accordingly, our model differs in this respect from the results of the literature reviewed.

Table VIII

Synthesis of primary and secondary factors capable of affecting organizational performance and the results of such performance


It also departs from those results in its dynamic rather than static nature, in that each of its elements is in constant interaction with the others and thus may be influenced and altered as they change over time. We believe that, just as satisfaction influences the quality of work life, thereby affecting individual and organizational performance, the latter will in turn alter the organizational climate and culture, along with the member's motivation and their group processes. We also believe that these secondary factors will in turn act on the procedures used by the organization, on the abilities and health of its members, and on its technology, physical environment and work conditions.

Of all the factors reviewed, those related to procedures, along with all the secondary factors and satisfaction (as an indicator of the quality of work life), seem to have the greatest impact on organizational performance. The factors related to individual abilities and health, as well as all the factors related to context, may possibly have less influence, or at least there are fewer reliable data available on those factors. Technology would appear to be capable of having a significant impact on organizational performance, but unfortunately there is little research evidence to support this assumption. Given the current state of knowledge in this regard, and the importance of creating a critical mass of conditions propitious to organizational performance, we believe that any evaluation of such performance must take into account all of these factors, regardless of the extent of their impact and whether or not their effect has been reliably assessed.

Moreover, any such evaluation should be partly science and partly art. As explained by Mirvis (1980), artists differ from scientists in that they do not impose form in their subject matter; they respond to the subject matter itself. They do not break it down and study it; they experience it fully and seek to represent that full experience. They do not stand apart from their study; they dwell in their medium. In order to establish mutually advantageous partnerships with organizations, study of the factors capable of affecting their performance must be based not only on scientific rigour and precision, but also on artistic imagination, empathy and intuition.

# CHAPTER II

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# FACTORS AFFECTING THE PERFORMA NCE OF AUTOMATED OFFICE INFORMATION SYSTEMS

In this chapter we will present the results of an exhaustive review of the literature related to performance factors specific to automated office information systems (AOIS). Note, first of all, that the authors of the literature concerned refer to factors contributing to the "success", rather than the "performance", of the systems considered. For purposes of the consistency and internal logic of this literature review, we will use the term "performance."

The documents reviewed essentially comprise:

- previous literature reviews;
- analyses of theories on resistance to change and the application of some of those theories as they relate to the acceptance of new technologies;
- studies (surveys, case studies, experiments);
- reports on findings by managers, management experts or workplace automation experts.

Some literature reviews have led to the development of models of factors capable of influencing system performance, but in all cases except one (Ein-Dor and Segev, 1981), these are models based on partial literature reviews or the synthesis of knowledge acquired in that field by their authors. The only model based on an exhaustive review of the literature is nine years old, and has not been empirically tested. Consequently, we have included it with the literature reviews.

Unlike ChapterI, this chapter will not present models of the factors we are studying, but simply a synthesis of all the works reviewed. That will enable us to develop, at the end of the chapter, a model of the factors capable of influencing organizational performance when AOIS are introduced. The model will take account of the one developed in the first chapter, related to the factors capable of affecting organizational performance, regardless of the introduction of such systems. But before presenting the results of this literature review, we will describe the contents of the documents in question and the way in which they will be presented.

The documents reviewed concern:

- automated office information systems (AOIS);
- end-user computer systems (ECS);
- management information systems (MIS);
- expert or decision-support systems (ES or DSS);
- network systems (N).

We have classified all the documents whose authors do not specify the type of technology dealt with, and which discuss information systems in general, with the works related to AOIS. In

addition, we have included documents concerning end-user computer systems in this review although, as noted in the definition in the introduction, that technology is not part of AOIS. The two types of systems nevertheless have some characteristics in common, inasmuch as they both relate to information technology employed by individuals.

The authors of the documents reviewed evaluate the performance of the systems considered using one or more of the following five criteria:

- use of the system;
- user satisfaction with the system;
- quality of decisions resulting from the system;
- acceptance of the system;
- success of implementation of the system.

Some authors (mainly managers, management experts and workplace automation experts) provide no evaluation criteria for the systems they examine, simply mentioning that some factors affect the "success" or "failure" of the system. Thus we need to establish a general criterion to determine whether a system has been successfully implemented, without going into more detail.

The effects of the different factors noted by the authors on the various performance criteria considered may be:

- positive (+);
- negative (-);
- nil (0);
- curvilinear (C);
- indeterminate (I);
- moderate (M).

In some cases, the authors mention a relationship between a factor and a performance criterion, but without specifying its valence (+, -, 0, etc.). When it is possible to infer that valence without biasing the author's views, we have done so. When it is not possible, we have simply recorded a relationship between the two variables in question, and the valence remains indeterminate.

On the basis of each of the aspects mentioned above (types of works reviewed, types of systems concerned, types of criteria used and results recorded), we have combined the various

factors mentioned in the documents reviewed into four main categories, further divided into subcategories, and related to: 1) individuals; 2)organizations; 3)the technology introduced; and 4)-the implementation procedures for that technology.

The data related to each category are presented in a series of tables. On the y-axis are shown the factors considered as well as the subcategories to which they relate; on the x-axis, the systems to which those factors relate, the performance criteria used, the results recorded and the number of authors who obtained those results. An asterisk next to the number means that it is a literature or research review. The last column on the right-hand side of the table gives the total number of authors who discuss each of the factors in the table. We will now use these tables to describe the essential findings of the works concerned.

#### 2.1 Factors related to individuals

We have broken down the factors related to individuals into three subgroups, covering users, senior managers and the implementation team.

#### 2.1.1 <u>Users</u>

Table IX shows that 11 factors relate to users: their age, cognitive style, education, perception of the project, attitude with respect to the introduction of the system, experience in the task to be performed with the help of the system, length of service and rank in the organization, amount of time spent using the system, training on the system, and the support provided for the use of the system.

According to Table IX, four studies discuss the influence of users' age on system performance. Two of them find a positive relationship between that factor and the use of AOIS (Lucas, 1975a, 1975b) or the acceptance of MIS (Dickson and Simmons, 1970).

Tal	ble	IX
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# Factors affecting AOIS performance, related to users

	AOIS ECS												MI	S			ES/	<b>D</b> S	S			NE	-			
FACTORS	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	TOTAL
age	+(1)													+(1	)*	o(2	)									4
cognitive style	+(2)	met	hod	ofu	ise		_				+()	l)			o(1) <sup>;</sup>	o(3 +(1	}	+()	l)	o(1)*						10
education	o(1)										+(1 0(2	)*				+(2	)									6
perception of project											+(1	)*														1
attitude				0(	1)		+(1)				+(1 0(1	)* 1)		+(	l)* +(	()+(	2)									8
experience/ task	i(1)										o(1	)		ĸ		i(1) o(1	)									. 4
length of service	-(1)			_											-(1)	* d(2	)					-				4
rank															-(1)	*										1
experience/ system					o(1) m(1)						c(1	l)*			•	o(1	)									4
training	+(1)	) o(1	.)		o(1) +(3)	+(1	)*			+(2)	+(	1)		+(	1)*+(1 m(1	)+(2	2) +(	1)		+(1)			•		•	17
support	ŀ					+(1	)+(2	2)		+(1)	ŀ				-			1								4

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance;

5: success

+: positive -: negative o:nil c:curvilinear i:indeterminate m:moderate

\*: refers to a literature review

Two other authors find no relationship between this factor and the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982).

Lucas' results are based on a survey of approximately 400accountants and sales staff in the manufacturing sector, those of Dickson and Simmons on a review of literature related to MIS, those of Fuerst on a survey of 64managers in 8 companies, and those of Fuerst and Cheney on additional analyses of the data compiled by Fuerst.

As TableIX shows, ten studies with differing results deal with users' cognitive style. Five show that the factor has a positive effect on the method of using AOIS (Benbasat and Dexter, 1979; Lucas, 1975a, 1975b), MIS (Lusk and Kersnick, 1979) and DSS (Vasarhelyi, 1977), or on the quality of decisions resulting from DSS (Motiwalla and Pheng, 1982). Five others found no effects on the success of MIS and DSS systems (Huber, 1983) or on the method of using DSS (DeSanctis, 1982; Fuerst, 1979; Fuerst and Cheney, 1982).

Aside from the surveys by Fuerst, Fuerst and Cheney, and Lucas, described above, these research findings are based on a review of the literature related to the effects of users' cognitive style on the success of systems (Huber, 1983) and on five experiments. All those experiments consisted of placing the subjects in simulated task situations and evaluating their reactions, given their cognitive styles (from highly analytic to low-analytic, or heuristic/analytic). The number of subjects and the type of tasks they were asked to perform were as follows:

Benbasat and Dexter:	(n = 48, simulated business environment);
DeSanctis:	(n = 88  students,  simulated warfare situation);
Lusk and Kersnick:	(n = 200  students, simulated task situation);
Motiwalla and Pheng:	(n = 51  flight officers, simulated warfare situation);
Vasarhelyi:	(n = 50, simulated financial planning situation).

Despite the positive relationships among the variables studied, Vasarhelyi nevertheless considers that the costs of designing a DSS adapted to users' cognitive styles would exceed the resulting benefits.

Six studies deal with users' education. Three of them find a positive relationship between that factor and the use of MIS (Schewe, 1976) or DSS (Fuerst, 1979; Fuerst and Cheney, 1982). The other three find no link between that factor and the use of AOIS (Lucas, 1975a, 1975b) or MIS (Ein-Dor and Segev, 1981; Kimberley and Evanisko, 1981).

Those conclusions are based on the results of four surveys and one literature review. Although the literature review, by Ein-Dor and Segev, includes findings specific to MIS systems, it considers all the literature related to AOIS, as well as some of the management and administrative literature. The four surveys were performed by Fuerst (n=64managers), Lucas (n=400accountants and sales staff), Kimberley and Evanisko (n=489hospital administrators) and Schewe (n=80-managers).

Only Ein-Dor and Segev (1981) mention users' perception of the project as a factor in the use of MIS. They consider that:

- the greater the perceived need for MIS among users, the greater the likelihood of success of such systems;
- the weaker the perception of power loss by users, the lower the level of conflict;
- the lower the level of conflict between users and implementors, the greater the likelihood of success of the system.

Eight studies deal with the effects of users' attitudes on different factors affecting system performance. Six of them report positive effects, while the other two find none. The positive results concern users' satisfaction with end-user computing (Rivard, 1986), the success of the system (Cerullo, 1980), use of (Ein-Dor and Segev, 1981) and resistance to the introduction of MIS (Dickson and Simmons, 1970), as well as the use of DSS (DeSanctis, 1982; Vasarhelyi, 1977). The nil results concern the success of AOIS (Delone, 1988) and the use of MIS (Schewe, 1976).

Aside from the literature reviews by Ein-Dor and Segev and Dickson and Simmons, concerning MIS systems specifically, these results are based on four surveys and two experiments. We have already described the survey by Schewe, as well as the experiments by DeSanctis and Vasarhelyi. That leaves the surveys by Rivard, Cerullo and Delone. The first looked at the attitudes of 272users, the second at 122employees of "Fortune1000" companies, and the third at AOIS managers and users in 93firms.

Note that although Delone concludes that attitudes have no effect on AOIS performance, he considers that a minimum of acceptance by users is necessary for the success of the system, but that a more favourable attitude will not enhance performance. He thereby contradicts DeSanctis, who feels that acceptance is a key factor in the performance of DSS systems, as well as the respondents to Cerullo's survey, who name attitude as the most important factor affecting the

performance of MIS systems. Nevertheless, although conclusions on this subject are not completely unanimous, the fact remains that most of the authors who have looked at the subject report positive relations between users' attitudes and system performance.

Four research studies deal with users' experience in the task. Two of them note relationships between this factor and the use of AOIS (Lucas, 1975a, 1975b), or of DSS (Fuerst, 1979), but without specifying the valence of that relationship. Two others find no link between this factor and the use of MIS (Kimberley and Evanisko, 1981) or DSS (Fuerst and Cheney, 1982).

Four studies deal with length of service in the organization. Two of them find no effect on the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982), and two others report negative effects on the use of AOIS (Lucas, 1975a) and on the acceptance of MIS (Dickson and Simmons, 1970).

According to the literature review by Dickson and Simmons (1970), the rank of users seems capable of increasing their resistance to MIS. No other research confirms or refutes that claim.

Four studies deal with the effects of users' experience in using the system on system performance. Two of them report that this factor has no effect on the success of AOIS (Delone, 1988) or the use of DSS (Fuerst, 1979). The literature review by Ein-Dor and Segev (1981) shows a curvilinear relationship between the amount of experience and the use of MIS. Finally, a survey of 42AOIS project implementation leaders shows that they considered that factor to be of little importance (Rivard and Bernier, 1989). As noted earlier, the Delone study involved AOIS managers and users from 93companies, and the Fuerst study looked at 64managers from 8 companies.

Seventeen studies deal with the influence of users' training on system performance. Fourteen find a positive relationship between those variables, one finds a weak relationship, and the other two find none. The positive results are noted in relation to the use (Goldberg, 1987-1988) and success of AOIS (Curley and Pyburn, 1982; Fitz-Enz, 1986b; Soderberg, 1989), the use (Henderson and Treacy, 1986) and success of end-user systems (Benson, 1983; Rockart and Flannery, 1983), the use (Pliniussen, 1984), acceptance (Markus, 1983) and success of MIS (Gorman, 1984) as well as the use (Fuerst, 1979; Fuerst and Cheney, 1982), success (Klingman *et al*, 1986) and user satisfaction with DSS (Sanders and Courtney, 1985). The nil results concern

the success (Delone, 1988) and user satisfaction of AOIS systems (Safayeni *et al*, 1987) and the weak results, the success of MIS (Cerullo, 1980).

These results are based on two literature reviews, four reports of personal findings, and nine surveys. The literature reviews were done by Henderson and Treacy and by Markus, bearing respectively on studies into end-user computer systems and on theories concerning resistance to change. Fitz-Enz and Pliniussen describe the results of their experiences in management, while Goldberg and Gorman report on their findings concerning workplace automation. Finally, the surveys were carried out by Benson, Cerullo, Curley and Pyburn, Fuerst, Delone, Rockart and Flannery, Safayeni *et al*, Sanders and Courtney, and Sodeberg. We will describe here only those not discussed in previous sections.

Benson:	Unstructured interviews with 67 users and 19 end-user computer system specialists, and observation of 20 sites where that technology was in place.
Curley and Pyburn:	Case studies of 13 organizations, and a longitudinal study of 33very large manufacturing and service companies.
Rockart and Flannery:	Interviews with 200microcomputer users and 50info-centre employees, in 50manufacturing companies and 4financial companies.
Safayeni et al:	Questionnaires completed by 19support employees of 2companies (manufacturing = 12, service = 7).
Sanders and Courtney:	Questionnaires completed by 378 DSS users in 124 organizations.
Sodeberg:	Longitudinal study of the automation process in a municipality, accompanied by interviews of 144employees and questionnaires completed by them.

Support for users refers mainly to the existence of a structure for assisting users, often in the form of an information centre. The four documents dealing with this aspect all concern enduser systems, and are unanimous in concluding that such a structure has positive effects on the use (Alavi and Weiss, 1985-1986), success (Rockart and Flannery, 1983) and user satisfaction with that technology (Bergeron and Bérubé, 1988; Rivard, 1986). The conclusions drawn by Bergeron and Bérubé result from a survey of 212users in 31Quebec organizations, while those of Rockart and Flannery and of Rivard are based on responses to questionnaires (n=250; n=272), and Alavi and Weiss describe their management experience.

We have presented the results of studies concerning 11 factors related to users: their age, cognitive style, education, perception of the project, attitude toward the implementation of the system, experience in the task to be performed with the help of the system, length of service and rank, experience in using the system, training on the system and the support they receive in its use.

Two of those factors seem to be particularly influential, i.e. training and users' attitudes toward the system. Fifteen of the works consulted, including two literature reviews, several case studies and large-scale surveys show that users' training improves system performance. Furthermore, six documents, including two literature reviews, as well as surveys and experiments, show that users' attitude influences system performance. Accordingly, any evaluation of AOIS performance should necessarily take account of those two important factors.

Two other user-related factors also seem capable of affecting system performance, although there is little proof of that in the works consulted: the support given to users, and their perception of the project. Four documents, including three surveys, concern user support, but they all deal with ECS. Nevertheless, it may be assumed that their conclusions could also apply to other types of systems. Only one document deals with users' perceptions of the project, but that work is an exhaustive review of literature bearing on all types of systems, and including some of the management and administration literature. In addition, it could be considered that users' perception determines their attitude to the project. As noted above, the latter factor seems to influence system performance. Consequently, despite the small number of studies dealing with each of those factors, we feel that any evaluation of AOIS performance should include them.

Such an evaluation should probably also include another factor related to users, namely their experience in using the system introduced. Four documents deal with that aspect; two find no relationship, one finds a moderate positive influence, and another, curvilinear results. It must be pointed out, however, that the first three were based on surveys, while the fourth was an exhaustive literature review. Only longitudinal studies can determine accurately the effects of such a factor. That is why Ein-Dor and Segev (1981) may well be correct when they suggest a curvilinear relationship between this factor and the use of systems, and also explains why this factor must be taken into account when evaluating system performance.

The results for all the other factors related to users are contradictory or ambiguous. Of the ten works bearing on users' cognitive style, for instance, five show positive results, and the others, nil results. It also seems that the costs of designing systems on the basis of users' cognitive styles exceed any possible benefits. In addition, the results are divided concerning education (three

positive results and three nil results, including one exhaustive literature review), age (two positive and two nil results), experience in the task (two nil and two indeterminate results), length of service (two negative and two nil) and rank (only one negative result, based on a literature review dating back to 1970).

Nonetheless, two comments apply to these results. First of all, with the exception of findings concerning users' cognitive styles, few studies consider the effects of these factors on system performance. In addition, apart from cognitive style, these are socio-demographic variables that are a normal part of research specifications. Thus, in view of the results of the works reviewed and the various considerations mentioned above, we feel that any evaluation of AOIS performance should include all the factors related to users mentioned, except perhaps for cognitive style, as we find the latter factor more marginal and more difficult to evaluate than the others. Since the research also fails to show that it has decisive effects on system performance, we feel that it would be preferable not to include it in any evaluation of AOIS performance, but rather that it is a variable suited to a specific research project.

#### 2.1.2 Senior management

As TableX shows, four factors relate to senior managers: their authority, willingness to change, active involvement in the automation project, and knowledge of the technology introduced.

	Tabl	eΧ	
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			AC	IS				EC	S				MI	5			ES/	DS	S		N					
FACTORS	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	TOTAL
decision-maki ng authority					+(1)														4							1
willingness to change							+(1)										-						_			1
involvement	+(1)*	k.			+(3)	+(1)					+(2)*	k.	+(1	)* +	-(4)*					+(1)						13
knowledge of the technology		+(1	)		+(1)										+(1)							*			+(1)	4

# Factors affecting AOIS performance, related to senior management

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indeterminate m: moderate

\*: refers to a literature review

Table X shows that only one study concerns senior managers' authority. That work is a collection of case studies, based on observation of and semi-structured interviews with representatives of 11Illinois municipalities (Rocheleau, 1988). The results show that it is desirable for managers involved in automation implementation committees to have decision-making authority. Such authority contributes not only to their credibility and the active involvement of their employees, but also simplifies the implementation of proposals made concerning the projects.

A survey of 270 microcomputer users shows that their satisfaction is affected by the willingness to change on the part of the project leader in the organization (Rivard, 1986). This author specifies that managers will have a more favourable perception of changes if they see them as likely to have significant effects.

According to TableX, 13 documents deal with managers' active involvement in the automation project. All of them conclude that this factor has positive effects on system performance. Four of them concern the use (Goldberg, 1987-1988) or success of AOIS (Canning, 1988; Delone, 1988; Robey and Zeller, 1978), while another deals with the use of microcomputers (Alavi and Weiss, 1985-1986). Six of them concern the use (Ein-Dor and Segev, 1981; Maish, 1979), acceptance (Markus, 1983) or success of MIS (Crawford, 1986; Edstrom, 1977; Gillin, 1983; Terlaga and Meyer, 1989). Finally, one other work deals with the success of DSS (Klingman *et al*, 1986).

Six of the works report on the findings of management experts (Alavi and Weiss, 1985-1986; Gillin, 1983; Terlaga and Meyer, 1989) or office automation experts (Crawford, 1986; Goldberg, 1987-1988; Klingman *et al*, 1986). Two of them are based on literature reviews (Ein-Dor and Segev, 1981; Markus, 1983) and five on surveys (Canning, 1988; Delone, 1988; Edstrom, 1977; Maish, 1979; Robey and Zeller, 1978).

Canning (1988) surveyed members of the American Association of Information Systems Professionals, for the purpose of discovering the factors essential to their success. As noted previously, Delone (1988) surveyed managers and AOIS users in 93 companies. The survey reported by Edstrom (1977) consisted of a series of semi-structured interviews with four groups of individuals (computer experts, line managers, project managers and users) associated with systems development in 16 companies. Maish (1979) conducted a study of MIS users in four US federal agencies. And, lastly, Robey and Zeller (1978) compared two departments of a company where an AOIS had been installed, using interviews, a review of documents and a questionnaire concerning

respondents' perception of the system. The questionnaire was completed by only seven employees in one of the departments studied, however, and by four in the other.

Based on their experience or the findings of their research, various authors propose certain considerations regarding the active involvement of managers in system implementation projects. Thus Edstrom (1977) considers that managers should be involved in the initial phase of the project, to determine the scope and direction of development efforts, but should not intervene in the detailed system design phases. Ein-Dor and Segev (1981) explain that top managers' active involvement in such projects depends on their appreciation, understanding, motivation and perceptions of the system. Goldberg (1987-1988) feels that the role of managers is to motivate their employees to accept automation and to create a climate favourable to change. Canning (1988) finds that the implementation of information systems depends more on the attitude of senior managers than on the technology itself. And, finally, Delone (1988) considers that the key to the success of such systems is the involvement of the project manager.

Four documents deal with the importance of managers' being familiar with the technology introduced. All four conclude that this factor has a positive effect on user satisfaction with AOIS (Safayeni *et al*, 1987) or on the success of AOIS (Delone, 1988), of MIS (Cerullo, 1980) and of networks (Van Name and Catchings, 1988). It will be remembered that these findings are based on the results of three surveys (Cerullo, 1980; Delone, 1988; Safayeni *et al*, 1987), but that there were only 19 respondents to the latter survey. The results reported by VanName and Catchings are based on the experiences of people from different organizations, involved in the implementation of local networks. The researchers consider that an in-depth knowledge of technology makes better-informed choices possible, and leads to more realistic expectations.

We have presented the results of research into four factors related to senior managers: their decision-making authority, their willingness to change, their active involvement in the automation project, and their knowledge of the technology.

Of the four factors, involvement in the automation project appears to be the most influential. Thirteen works, including three literature surveys, case studies, surveys and observations and experiences of management or workplace automation experts, confirm the beneficial effects of this factor on the performance of various systems.

Little research has been done into the other factors concerning senior managers. The studies that have been done, however, suggest that their knowledge of the technology (four surveys of

users or specialists), decision-making authority (11case studies) and their willingness to change (one survey of users) would also be likely to improve system performance. Any evaluation of their performance should therefore take the four factors related to senior managers into account.

## 2.1.3 The implementation team

Table XI shows that there are four factors related to the implementation team: skills, relations with users, relations with managers and members' involvement in the needs definition and system design phases.

Tal	ble XI	
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# Factors affecting AOIS performance, related to the implementation team

	AOIS	ECS	MIS ES / DSS NETWORK						
FACTORS	1 2 3 4 5	12345	1 2 3 4 5	1 2 3 4 5	12345				
skills	+(3)		+(1) +(3)		+(1)	8			
relations/users	+(1) +(2)		+(2)* +(1)*			6			
relations/ managers			+(1)*			1			
involvement			±(1)			1			

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indeterminate m: moderate

\*: refers to a literature review

Eight documents concern the relations between the skills of the automation project implementation team and system performance, and all of them see a positive link between those variables. Three concern the success of AOIS (Kaiser and Srinivasan, Table10, 1982; Lehrer, 1983; Rivard and Bernier, 1989), four deal with the use (Maish, 1979) or success of MIS (Cerullo, 1980; Pinto and Slevin, 1987, 1988; Pyle, 1986) and one other looks at the success of networks (VanName and Catchings, 1988).

The different authors base their findings on surveys (Cerullo, 1980; Kaiser and Srinivasan, 1982; Maish, 1989; Pinto and Slevin, 1987, 1988; Pyle, 1986; Rivard and Bernier, 1989; Van-Name and Catchings, 1988), case studies (Pyle, 1986) and personal experience as a workplace automation expert (Lehrer, 1983). Kaiser and Srinivasan surveyed some one hundred AOIS users and analysts, while Pinto and Slevin examined the experiences of 400 persons involved in the introduction of MIS, and Pyle surveyed 55 respondents from about 30 different manufacturers. Pyle also conducted four case studies, through interviews with MIS implementation team leaders. The research by Rivard and Bernier consisted of a review of literature on factors affecting the success of AOIS, and group meetings with automation project managers, to verify and revise the list of factors resulting from the review. Using the new list obtained, they then sent a questionnaire to 42 implementation team leaders, and employed statistical analyses of the results to identify the most important factors in the success of AOIS, according to the project managers interviewed.

Some results suggest that a multidisciplinary implementation team, located in one place, is best (Pyle, 1986). Other results indicate that it is best for the team to be not only skilled, but stable (Rivard and Bernier, 1989) and involved throughout the automation process (Lehrer, 1983). Finally, according to Cerullo (1980), the skills of the team are one of the most important factors in the success of MIS.

Six documents concern relations between users and the implementation team, and reveal the positive effects of this factor on the success of AOIS (Kayser and Srinivasan, 1982; Rivard and Bernier, 1989), on user satisfaction (Safayeni *et al*, 1987), and the acceptance (Markus, 1983) and use of MIS (Ein-Dor and Segev, 1981; Maish, 1979). Aside from the literature review by Ein-Dor and Segev and that conducted by Markus, on resistance to change, all the documents report on survey results described earlier.

Rivard and Bernier (1989) note that project managers consider the amount of communication between the implementation team and users to be important. Ein-Dor and Segev (1981) explain that the less users associate the arrival of the team with a loss of power, the lower

the level of conflict, and the greater the likelihood of the project's success. In the opinion of Kaiser and Srinivasan (1982), relations between the implementation team and system users are a major factor affecting performance.

Only Ein-Dor and Segev (1981) consider the relations between the implementation team and managers as a factor likely to influence the use of MIS. They add that the more rigorous the controls established by top management over MIS staff, the greater the likelihood of success of MIS projects.

Only Edstrom (1977) deals with the involvement of the implementation team in this phase. His research, as noted earlier, consisted in semi-structured interviews with four groups of individuals associated with MIS development in 16companies. The results obtained show that the involvement of the project implementation team in the needs definition phase jeopardizes its success, whereas its involvement in system design is an advantage.

We have presented the results of research into four factors related to the implementation team: its skills, relations with users, relations with managers, and involvement in needs definition and system design phases.

According to the results of the studies and observations reviewed, two factors seem to have a particular influence on system performance: the skills of the team, and its relations with system users. Eight documents, including case studies, and surveys resulting from literature reviews, confirm the beneficial effects of the first factor, and six others, including two literature reviews and surveys, confirm the second.

One exhaustive literature review also shows that relations between the implementation team and managers influence system performance. And, finally, according to one survey, the involvement of the implementation team in defining the needs related to systems seems to have different effects, depending on the system development phase. Any evaluation of AOIS performance should therefore include the four factors mentioned in relation to the implementation team.

## 2.2 Factors related to the organization

We have subdivided the factors related to the organization into three subgroups, concerning the physical environment, structure and organizational procedures, respectively.

## 2.2.1 Environment

Table XII shows that two factors concern the physical environment: access to equipment, and workstation ergonomics.

## Table XII

Factors affecting AOIS performance, related to the physical environment and organizational structure

· · ·	AOIS	ECS	MIS	ES / DSS	NETWORK		
FACTORS	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	TOTAL	
access	+(1)+(1) +(2)	+(1)	+(1)	o(1)		7	
workstation ergonomics	+(3)					3	
unit size			o(1)			1	
organizaion size	+(1)		+(3)* i(1)			5	
centralization	+(1) +(1)		-(1) o(1) +(1)*			5	
formalization	+(1) -(2) +(2)		+(1)*			6	
complexity	-(1)			o(1)		2	
stability	+(1)		+(1)	o(1)		3	
flat/tall hierarchy	-(1)		+(1) o(1)			3	

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indéterminate m: moderate

\*: refers to literature review

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According to Table XII, seven documents deal with the effects of access to systems on their performance. They note that this factor apparently affects the use (Ahlin, 1989) or success of AOIS (Delone, 1988; Rocheleau, 1988), as well as user satisfaction (Safayeni *et al*, 1987), the satisfaction of microcomputer users (Rivard, 1986) and the use of MIS (Maish, 1979).

All the documents in question are based on surveys described earlier, except that of Ahlin (1989), who conducted eight case studies involving 269 persons, using inventories, observations, interviews and questionnaires. According to him, the availability of equipment in public areas encourages its use, as long as individuals do not have computers at their workstations. The data compiled by Safayeni *et al* (1987), however, reveal that users (n=19) are more satisfied when they have continuous access to their own equipment. The results obtained by Fuerst (1979) indicate, on the contrary, that distance travelled to interact with a DSS has no effect on its use (n=64).

We discussed workstation ergonomics in ChapterI (section1.2.1.3), listing the factors related to the physical environment capable of influencing organizational performance. Three studies mentioned in that section deal with AOIS specifically. They indicate that reducing screen glare (Springer, 1989) or providing more functional and comfortable offices (Dressel and Francis, 1987; Schneider, 1985) would seem to increase workers' productivity.

Only Dressel and Francis explain the method used to obtain their data. Their study concerned six groups, of which two groups of 17 acted as experimental groups. One of them was equipped with improved conventional workstations, and the other with workstations with built-in equipment. The other four groups served as controls. The distribution of the groups was planned. Their productivity was measured in terms of the number of hours worked and the quantity of products turned out, over the year preceding and the year following the installation of the workstations.

Access to equipment seems the more influential of the two factors considered related to the physical environment, or at least the factor that received the most study. Six documents, based on case studies and surveys, find that this factor leads to an improvement in system performance. Three works also note that ergonomic workstations also improve system performance. Any evaluation of AOIS performance should therefore take all these factors into account.

## 2.2.2 Structure

As Table XII shows, seven factors affecting system performance relate to organizational structure: the size of units and of the organization, its centralization, formalization and complexity, its stability and flat/tall hierarchy.

Only one study deals with the size of units as a factor. The author (Gremillion, 1984) looked for links between the size of 66administrative units of a US government agency and the voluntary use of MIS, and found none.

Five documents look at the size of organizations. Four of them see a positive relationship between this factor and the use of AOIS (Delone, 1981) and MIS (Ein-Dor and Segev, 1981; Kimberley and Evanisko, 1981; Moch and Morse, 1977). A further document notes a relationship between the size of organizations and the success of MIS, but without specifying whether that relationship is positive or negative (Pyle, 1986).

With the exception of one literature review (Ein-Dor and Segev, 1981), all the authors' conclusions are based on surveys. Moch and Morse (1977) consulted medical and administrative authorities in 489 hospitals, and showed that the size of the hospital determined the number of innovations adopted. According to a number of authors, the quantity of equipment in an organization is a valid indicator of its use. The results obtained by those researchers were confirmed in a subsequent study conducted by Kimberley and Evanisko (981), who re-analysed the data gathered by Moch and Morse.

Five documents examine the centralization of organizations, with varying results. Three of them find a positive relationship between this factor and the use (Robey and Zeller, 1978) or success of AOIS (Ginzberg, 1980), or the use of MIS (Ein-Dor and Segev, 1981). Two others find a negative relationship (Moch and Morse, 1977) or none at all (Kimberley and Evanisko, 1981; Moch and Morse, 1977) between centralization and the use of MIS. The latter authors specify that this factor restricts the use of MIS when those systems reflect the interests or views of decision-makers. If the opposite applies, there would not seem to be any relationship between centralization and the use of such systems.

These results are based on one literature review (Ein-Dor and Segev, 1981), on the application of the contingency approach to AOIS and of research done using that approach (Ginzberg, 1980) and on various surveys.

Six documents deal with the formalization factor. Four of them conclude that this factor has positive effects on the success (Ginzberg, 1980; Rivard and Bernier, 1989) or use of AOIS (Robey and Zeller, 1978) and on the use of MIS (Ein-Dor and Segev, 1981). Two others, however, find that this factor has negative effects on the satisfaction of AOIS users (Safayeni *et al*, 1987) and microcomputer users (Bergeron and Bérubé, 1988).

These conclusions are based on one literature review (Ein-Dor and Segev), one review of research work done using the contingency approach (Ginzberg) and other surveys (Bergeron and Bérubé: n=19 users).

Robey and Zeller feel that the system implementation phase requires a clear division of responsibilities; ambiguity may lead to failure. They also consider that a lack of formalization is also likely to produce more conflicts concerning the rules to be applied and participants' roles.

Two surveys concern the links between organizational complexity and system performance (Fuerst, 1979: n=64 managers; Robey and Zeller, 1978: n=11 users). Robey and Zeller conclude that this factor has negative repercussions on the use of AOIS, while Fuerst finds no relationship between this factor and the use of DSS.

Three documents concern the stability of the environment. Two of them find that this factor has a positive effect on the success of AOIS (Ginzberg, 1980) and the use of MIS (Schroeder and Benbasat, 1975). Another finds no relationship between this factor and the use of DSS (Fuerst, 1979). The study by Schroeder and Benbasat consisted in placing some 50 sales representatives in decision-making situations. Their results show that the stability of the environment has a significant effect, not only on the way in which the system is used, but also on the form and quantity of information requested.

Three documents deal with the question of flat/tall hierarchies. One shows a negative relationship between this factor and the success of AOIS (Ginzberg, 1980), another finds a positive relationship with the use of MIS (Moch and Morse, 1977), while for the third, there is no relationship with the use of MIS (Kimberley and Evanisko, 1981). As noted earlier, the latter researchers re-analysed data gathered by Moch and Morse from 489 hospital administrators.

We have reported the findings of literature concerned with seven factors related to organizational structure: the size of units and of the organization, its centralization, formalization and complexity, stability and flat/tall hierarchies.

These findings are conclusive with regard to one factor only: the size of the organization. Four documents, including one literature review, case studies and surveys, indicate that system performance improves with the size of the organization. Four others, including a literature review, a review of research based on the contingency approach, and a survey resulting from a literature review, find that system performance also increases with the formalization of the automation project. Two other works reveal, however, that formalization can reduce user satisfaction. The few studies on the effects of all the other aspects of organizational structure on AOIS performance are inconclusive or contradictory.

These studies differ somewhat from those on which we reported with respect to the effects of organizational structure on its performance. Those documents found that the size of organizations (in particular with reference to units, departments or work groups), as well as their degrees of complexity and centralization, had negative repercussions on their performance. They also noted possibly negative effects of a flat/tall hierarchy or excessive formalization on organizational performance.

The works related to AOIS seem to show instead that the size of organizations and the amount of formalization of the automation project have positive effects on AOIS performance. Thus it appears that these two factors may have different effects, depending on whether they concern the performance of organizations or of systems.

Given the limited number of studies bearing on the effects of organizational structure both on the performance of organizations and of systems, and in view of the ambiguous results of those works and their apparent contradiction in some cases, we feel that any evaluation of the performance of AOIS must necessarily take them into account, in an attempt to determine their effects.

Such an evaluation would take them into consideration as factors affecting general organizational performance, rather than as factors specific to AOIS, even if some works indicate that their effects could vary depending on whether the subject is organizational performance or system performance, since we feel that the latter is an integral part of the former. Stability would therefore not be taken into account, since it was not selected as a general factor affecting organizational performance.

### 2.2.3 Procedures

Table XIII shows that five factors are associated with organizational procedures: complexity of tasks to be performed using systems, appropriateness of mechanisms for exchanging and disseminating information during system implementation, organizational support provided for system implementation, performance incentives, and environmental stress.

Three studies deal with the complexity of tasks to be performed using systems. One survey shows that those responsible for implementing AOIS consider this factor important, but gives no details on its impact (Rivard and Bernier, 1989). Another survey notes that there is no connection between this factor and the extent to which DSS is used (Fuerst, 1979: n = 64 managers). And a final study points out that complexity of the task is detrimental to the quality of decisions made using DSS (Motiwalla and Pheng, 1982: n=51 flight officers in a simulated warfare situation).

Ten documents deal with the appropriateness of mechanisms for exchanging and disseminating information during system implementation. All conclude that this factor has a positive impact on the use (Goldberg, 1987-1988) or success of AOIS (Lehrer, 1983; Rocheleau, 1988), the success of end-user computing systems (Rockart and Flannery, 1983), and the acceptance (Dickson and Simmons, 1970) or success of MIS (Cerullo, 1980; Crawford, 1986; Edstrom, 1977; Gillin, 1982; Pinto and Slevin, 1987,1988).

Four of these documents are based on their authors' experience in workplace automation (Crawford, Goldberg, Lehrer) or management (Gillin), another is based on a review of the literature concerning MIS (Dickson and Simmons), and the other five report the findings of case studies (Rocheleau) or surveys (Cerullo, Edstrom, Pinto and Slevin, Rockart and Flannery).

Table 2	XIII
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			AO	IS			-	EC	S		MIS ES / DSS								•	NI							
FACTORS	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	, <u> </u>	3 4	<u>ا</u>	5	1	2	 3 4	ŀ	5	
task					i(1)							×				o(1)	-	-(1)						×			3
communica- tions	+(1)				+(2)					+(1)			-	+(1)*	+(4) m(1)									 			10
organizatio nal support		+(1)				+(1)*					+(1)*			+(1)*	+(1) * m(2)	o(2) +	+(1)			+()	1)						11
performance incentives	+(1)				+(2)									+(2)	* +(1)												6
environmental stress																			Ŧ	l)							1

# Factors affecting AOIS performance, related to organizational proced

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indeterminate m: moderate

\*: refers to a literature review

Organizational support means not only the human, materiel and financial resources allocated to the system implementation project, but also management's confidence in the project (Pinto and Slevin, 1987, 1988).

Eleven documents deal with this factor. Ten of them report positive effects on satisfaction with AOIS (Tait and Vessey, 1988) and DSS (Sanders and Courtney, 1985), the use of ECS (Henderson and Treacy, 1986) and MIS (Ein-Dor and Segev, 1981), the acceptance (Dickson and Simmons, 1970) and success of MIS (Cerullo, 1980; Pinto and Slevin, 1987; Pyle, 1986), and the success of DSS (Klingman *et al*, 1986), while two documents indicate that this factor has no impact on the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982).

These findings are based on two literature reviews of different scope (Ein-Dor and Segev; Dickson and Simmons), one review of research concerning ECS (Henderson and Treacy), the results of the experiences of Klingman *et al* in DSS implementation, and studies (Pyle: n=4) and surveys (Cerullo: n=122 managers; Fuerst; Fuerst and Cheney: n=64 managers; Pinto and Slevin: n=418 project managers, implementation team members and users; Pyle: n=55 users; Sanders and Courtney: n=378 users. Note that Tait and Vessey's survey was conducted on AOIS users from 30 organizations in different sectors of economic activity).

Six documents indicate that performance incentives have a positive impact on the use (Goldberg, 1987) and success of AOIS (Canning, 1988; Rocheleau, 1988), as well as on the success (Crawford, 1986) and acceptance of MIS (Dickson and Simmons, 1970; Markus, 1983).

These findings are based on reviews of the literature on resistance to change (Markus) and on MIS (Dickson and Simmons), their authors' experience in workplace automation (Crawford, Goldberg), case studies (Rocheleau: n=11), and one survey of AOIS professionals (Canning).

Only Motiwalla and Pheng (1982) mention environmental stress as a factor capable of affecting the quality of decisions supported by DSS. It will be remembered that their experimental study involved placing 51flight officers in a simulated warfare situation. According to the results obtained, moderate stress enhances the quality of decisions made using a system, while low stress levels reduce it.

We have reported the findings of the literature concerning five factors associated with organizational procedures: complexity of tasks to be performed using systems, appropriateness of mechanisms for exchanging and disseminating information, performance incentives, and environmental stress.

Three of these procedures appear to have particularly significant effects on system performance, namely, the type of communications concerning the automation project, support given to the project, and performance incentives. Ten documents, including one literature review, several case studies and four large-scale surveys, indicate that mechanisms for exchanging and disseminating information during system implementation influence its performance. Moreover, nine documents, including one review of research concerning ECS, two literature reviews, several case studies (n=11) and five large-scale surveys, stress the beneficial impact on system performance of the support given by the organization to the automation project. Six documents, including one literature review of theories on resistance to change, several case studies and one survey, point out the benefits of performance incentives.

The literature does not, however, allow us to conclude that the other two factors considered with respect to organizational procedures are important, since the few studies on the complexity of tasks to be performed using systems are contradictory, and only one research study deals with environmental stress.

Three of the five factors concerning organizational procedures (tasks, communications and performance incentives) are, however, general factors affecting organizational performance. We therefore think that any evaluation of the performance of AOIS should include them as such, and not as AOIS-specific factors.

With respect to the factors concerning AOIS-specific procedures, such an evaluation, in our view, should include organizational support alone. Indeed, we consider environmental stress an aspect that is too marginal and moreover too difficult to evaluate for it to be included automatically in an evaluation matrix.

## 2.3 Factors related to technology

We have grouped factors related to technology into three subgroups concerning respectively the systems themselves, their compatibility with individuals and organizations, and the characteristics of the information they provide.

### 2.3.1 The system

Table XIV shows that four factors are associated with systems: cognitive ergonomics, system response time, system processing capabilities, and user-friendliness of software.

By cognitive ergonomics of the system we mean its adaptability, learnability and usability, the integration of all components controlled by the same language, the ease with which data entry may be corrected, the flexibility of the information format, etc. As Table XIV illustrates, eight documents deal with this factor. All of them conclude that it has a positive impact on the satisfaction of AOIS users (Tait and Vessey, 1988) or MIS users (Caroll, 1982), the use (Ein-Dor and Segev, 1981; Maish, 1979), acceptance (Pliniussen, 1984) and success of MIS (Horton, 1984), and the success of DSS (Klingman *et al*, 1986; Meador *et al*, 1982).

# Factors affecting AOIS performance, related to systems

	AOIS	ECS	MIS	ES / DSS	NETWORK			
FACTORS	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	TOTAL		
cognitive ergonomics			+(2)* +(1) +(1)+(1)	+(2)		8		
processing capabilities			+(1)*					
response time		+(1)				3		
users- friendliness			+(1)*	o(2)		1		

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i; indeterminate m: moderate

\*: refers to a literature review

Aside from Ein-Dor and Segev's literature review, these findings are based on the experience of workplace automation experts (Klingman *et al*) or information management experts (Caroll, Horton, Pliniussen), and on surveys. The Meador *et al* survey involved 73managers in 20companies. Note that, in Caroll's view, systems presenting excessively complex or unfamiliar attributes may give rise to low levels of confidence and satisfaction, even if they generate better quality results.

Three documents deal with the influence of system response time on their performance. One concludes that there is a positive effect on PC users' satisfaction (Rivard, 1986). The other two conclude that there is no relationship between this factor and the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982).

The findings of the literature review carried out by Ein-Dor and Segev (1981) show that the more highly developed and the more flexible the processing capabilities of an MIS, the more it is used.

Rivard's (1986) survey of 272PC users shows that the user-friendliness of software affects their satisfaction.

We have reported the findings of the literature concerning four factors relating to systems themselves, namely, cognitive ergonomics, system response time, system processing capabilities, and user-friendliness of software.

Of these factors, cognitive ergonomics appears to have the most influence, or at least to be the aspect dealt with in the largest number of documents (one literature review, three surveys and the observations of four management or workplace automation experts). Systems' processing capabilities (one literature review) and user-friendliness of software (one survey) also appear to affect system performance, but very few studies confirm this. As to the impact of system response time on system performance, survey findings are contradictory (one positive result, and two nil).

To appreciate these results properly, one must consider that, on the one hand, little research has dealt with the impact of system-related factors on system performance and, on the other hand, such impact is hard to gauge by means of surveys. Therefore, while the ergonomics of the systems alone appear to have an irrefutable influence on system performance, we believe any evaluation of the latter should include the four factors mentioned with respect to systems.

# 2.3.2 <u>Compatibility</u>

As Table XV shows, there are two factors relating to system compatibility, namely, their compatibility with individual needs, and their compatibility with organizational needs.

Tabl	e X	CV
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# Factors affecting AOIS performance, related to system compatibility and characteristics of information produced

		AC	DIS			ECS							ES / DSS																
FACTORS	1 2	2	3	4	5	1	2	, 3	34	ŀ	5	1	2	3	4	5	1	2	3	4	ŀ	5	1	2	3	4	4	5	TOTAL
system/ individuals	+(1)	)										+(1)*										-							2
system/ organization												+(1)*																	1
accuracy	+(1)	)			+(1)					<del>, , , , , , , , , , , , , , , , , , , </del>							+(2)												4
relevancy	+(1)	)							-								+(2)						-						3
format	+(1)	)															o(1)												2
quantity	+(1)		×												_			,											1

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indeterminate m: moderate

\*: refers to a literature review

Two documents deal with compatibility between the system and users' needs. One shows that this factor influences AOIS users' satisfaction (Toudkin and Simis, 1980). The other shows that it contributes to the use of MIS (Ein-Dor and Segev, 1981). Toudkin and Simis's findings are based on responses from 36AOIS users to a self-administered questionnaire.

The literature review carried out by Ein-Dor and Segev (1981) indicates that compatibility (fit) between the system and organizational needs increases the extent to which MIS is used.

Only three documents deal with the compatibility of systems with individuals and organizations. One exhaustive literature review does, however, point out the beneficial effects of these two factors on system performance. Indeed, it seems obvious that such factors influence performance. We therefore feel that any evaluation of AOIS performance must necessarily include them.

#### 2.3.3 Characteristics of information

Table XV also shows that four characteristics of the information generated by systems (accuracy, relevancy, format and quantity) are capable of influencing system performance.

Four documents deal with the accuracy of information. They show that this factor enhances AOIS users' satisfaction (Senn, 1980) as well as the success of these systems (Toudkin and Simis, 1980) and the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982). Senn's findings are based on responses from 60managers to a postal questionnaire.

Three documents deal with the relevancy of information generated by systems. They point out that this factor enhances AOIS users' satisfaction (Senn, 1980) and the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982).

Two documents, whose conclusions differ, deal with the format of information generated by systems. Senn's (1980) survey indicates that this factor has an influence on AOIS users' satisfaction, while Fuerst's (1979) survey indicates that it has no impact on the use of DSS.

Senn's (1980) survey also reveals that the quantity of information generated by the system enhances AOIS users' satisfaction.

We have reported the findings of the literature concerning four factors relating to the characteristics of information generated by systems: its accuracy, relevancy, format and quantity.

Aside from format, all these factors appear to contribute to system performance. But only a few surveys (three for accuracy, two for relevancy, and only one for quantity), based on a small number of respondents, support this statement. Nonetheless, we think it quite obvious that the characteristics of information generated by systems are capable of influencing system performance. We therefore feel that any evaluation of AOIS performance should take each of the abovementioned factors into account, including format, since research on those factors to date is not sufficient for their impact on system performance to be properly gauged.

#### **2.4** Factors related to implementation procedures

We have grouped the factors related to implementation procedures into three subgroups, concerned respectively with the planning, development and follow-up of the implementation project.

#### 2.4.1 <u>Planning</u>

Table XVI shows that 10 factors relate to the planning of system implementation: development of a master plan, establishment of a steering committee, user and management participation in implementation planning, identification of implementation goals, identification of users and definition of their needs, selection and appropriate allocation of personnel on the basis of tasks to be performed in the context of implementation, modification of work processes, and equipment acquisition strategy.
## Factors affecting AOIS performance, related to implementation prodedures (planning)

	AOIS					ECS					MIS						ES / DSS						NETWORK						
FACTORS	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2			4	5	1	2	3		4	5	TOTAL	
master plan	+(1)				+(4)		+(1)			+(2)	+(1)*				+(5)						+(1)			_		-	+(2)	17	
steering committee															m(1)											-		1	
user participation					+(5)				+(1	1)				+(1	)*	o(2)												9	
management participation	+(2)				+(1)										+(3)					-								6	
goals					+(5)					+(1)	+(1)*			+(1)	)*+(1)						+(2)							11	
users								-			+(1)*	:		+(1)	*+(2)*						+(1)							5	
needs					+(1)						+(1)*			+(1	)*+(1)													4	
selection/ personnel														+(1	)*+(3)						+(1)							5	
work process					+(4)														•									4	
equipment acquisition											+(1)*																	1 -	

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indeterminate m: moderate

\* : refers to a literature review

Seventeen documents deal with the importance of developing a master plan which formalizes intentions with respect to system implementation while specifying the procedures for implementing the project. These documents show that this factor increases the use (Goldberg, 1987-1988) and success of AOIS (Canning, 1988; Curley and Pyburn, 1982; Lehrer, 1983; Rocheleau, 1988), the success of ECS (Alavi and Weiss, 1985-1986; Rockart and Flannery, 1983) and the satisfaction of its users (Bergeron and Bérubé, 1988), the use (Ein-Dor and Segev, 1981) and success of MIS (Gorman, 1984; Horton, 1984; Pinto and Slevin, 1987, 1988; Raysman, 1981; Terlaga and Meyer, 1989), and the success of DSS (Meador *et al*, 1982) and networks (Di Carlo, 1988; Van Name and Catchings, 1988).

These data are based on one literature review (Ein-Dor and Segev), observations and experiences of management experts (Alavi and Weiss; Di Carlo; Gorman) or system implementation experts (Goldberg; Horton; Lehrer; Raysman; Terlaga and Meyer; Van Name and Catchings), case studies and surveys. Briefly, the latter consisted of:

Bergeron and Bérubé:	survey of 212 users in 31 organizations.
Canning:	survey of U.S. AOIS professionals.
Curley and Pyburn:	13 case studies and one longitudinal (two-year) survey of 33- manufacturing and service companies.
Meador et al:	survey of 73 users and designers of 34DSS in 18 companies.
Pinto and Slevin:	survey of 400 MIS users.
Rocheleau:	case studies of 11 Illinois municipalities.
Rockart/Flannery:	survey of users (n=200) and info-centre employees (n=50) in very large manufacturing and financial companies.

According to the findings of Cerullo's (1980) survey of 122employees of Fortune 1000 companies, the creation of a steering committee has little impact on the success of MIS.

Nine documents deal with user participation in planning system implementation. Seven indicate that this factor enhances the success of AOIS (American Productivity Center, 1982; Lehrer, 1983; Mason, 1980; Sodeberg, 1989; Stankard, 1986a) and ECS (Rockart and Flannery, 1983), and the acceptance of MIS (Dickson and Simmons, 1970), while two others mention that user participation has no impact on the use of DSS (Fuerst, 1979; Fuerst and Cheney, 1982).

These data are based on a review of the literature concerning MIS (Dickson and Simmons), observations and experiences of management experts (Mason) or workplace automation experts (Lehrer; Stankard), a longitudinal case study of system implementation in a municipality, accompanied by interviews and questionnaires addressed to 144employees (Sodeberg), and surveys (American Productivity Center: n=99firms; Fuerst: n= 64managers; Rockart and Flannery: n=250info-centre users and managers). Note that Fuerst and Cheney's research involved re-analysing data previously compiled by Cheney.

Six documents indicate that the participation of managers in a system implementation project increases the use (Goldberg, 1987-1988; Lehrer, 1983) and success of AOIS (Benson, 1983) and the success of MIS (Cerullo, 1980; Horton, 1984; Pyle, 1986). These documents are based on their authors' experience (Goldberg; Horton; Lehrer), and on case studies (Benson: n=-20; Pyle: n=4) and surveys (Cerullo: n=122very large companies; Pyle: n=55 users).

Eleven documents deal with the need to identify automation project goals clearly and the importance of their consistency with the goals of the organization promoting the project. These documents concern the success of AOIS (Bolte, 1983-1984; Canning, 1988; Curley and Pyburn, 1982; Lehrer, 1983; Yellowlees, 1986), ECS (Alavi and Weiss, 1985-1986), MIS (Pinto and Slevin, 1988), DSS (Klingman *et al*, 1986) and ES (Barcelo, 1988), as well as the use (Ein-Dor and Segev, 1981) and acceptance of MIS (Dickson and Simmons, 1970).

These findings are based on two literature reviews (Dickson and Simmons; Ein-Dor and Segev), the experience of management experts (Alavi and Weiss; Bolte) or workplace automation experts (Klingman *et al*; Lehrer; Yellowlees), case studies (Curley and Pyburn: n=13) and surveys (Barcelo; Canning; Curley and Pyburn; Pinto and Slevin). Note that Barcelo's survey covered 125-U.S. companies.

By identification of users we mean identification of some of their personal characteristics (needs, status, personality, etc.) capable of influencing their relations with the system. Five documents indicate that this factor has an influence on the use (Ein-Dor and Segev, 1981), success (Pyle, 1986; Terlaga and Meyer, 1989) and acceptance of MIS (Markus, 1983), and on the success of DSS (Klingman *et al*, 1986). These data come from literature reviews (Ein-Dor and Segev; Markus), cases studies (Pyle) and implementation site observations (Klingman *et al*; Terlaga and Meyer).

By definition of users' needs we mean analysis of their work methods, the number of transactions they perform, etc. Four documents show that this factor has an impact on the success of AOIS (Kaiser and Srinivasan, 1982) or MIS (Terlaga and Meyer, 1989) and on the use (Ein-Dor and Segev, 1981) and acceptance (Dickson and Simmons, 1970) of MIS.

Aside from Dickson and Simmons's and Ein-Dor and Segev's literature reviews, these data come from a survey of 100 or so AOIS users and analysts (Kaiser and Srinivasan) and from implementation site observation (Terlaga and Meyer).

Five documents indicate that selection and appropriate allocation of personnel on the basis of tasks to be performed in the context of system implementation increase the chances of the acceptance (Markus, 1983) and success of MIS (Caroll, 1982; Gorman, 1984; Pinto and Slevin, 1987, 1988) and DSS (Meador *et al*, 1982).

These documents are based on one review of the literature concerning resistance to change (Markus), the observations and experiences of their authors (Caroll; Gorman), and surveys (Meador *et al*: n=73 users; Pinto and Slevin: n=400users).

By modifications to work processes we mean the review and simplification of operations and procedures prior to system implementation. Four workplace automation experts consider that this factor has an influence on the success of AOIS (Bolte, 1983-1984; Bowen, 1986; Stankard, 1986b; Yellowlees, 1986).

The findings of the literature review conducted by Ein-Dor and Segev (1981) indicate that equipment acquisition strategy has an impact on the use of MIS. These authors point out a number of risks associated with introducing equipment pell-mell: acquisition of incompatible equipment, duplication of applications, and data security problems.

We have reported the findings of the literature concerning 10 factors relating to implementation planning: development of a master plan, establishment of a steering committee, user and management participation in implementation planning, identification of implementation goals, identification of users and definition of their needs, selection and appropriate allocation of personnel on the basis of tasks to be performed in the context of implementation, modifications to work processes, and equipment acquisition strategies. According to the findings of the literature reviewed, these 10 factors contribute to system performance. Except for the establishment of a steering committee, management participation in implementation planning, and modifications to work processes, the impact of all these factors is confirmed by literature reviews.

Only one of these factors, namely, the establishment of a steering committee, appears to affect system performance only moderately, according to the findings of just one survey. But establishing such a committee may be thought to follow logically from the development of a master plan. The importance of this factor is pointed out by 16documents.

On the other hand, a single survey of limited scope indicates that user participation in the planning of system implementation has no effect on system performance, while seven documents, including one literature review, one longitudinal study and one large-scale survey, maintain the opposite.

We therefore feel that any evaluation of AOIS performance should take into account all the factors mentioned with respect to implementation planning. We list them below, in order of relative importance, that is, according to the number of studies which point out their beneficial impact on system performance. Note that one of these factors, modifications to work processes, is one of the general factors affecting organizational performance and is not AOIS-specific.

17 + 1

11

7

6

5

5 4

4

1

Development of master plan and establishment of committee Identification of goals User participation Management participation Identification of users Selection of personnel Definition of needs Modifications to processes Equipment acquisition strategy

#### 2.4.2 Development

As shown in Table XVII, three factors relate to system development: user and management participation in development, and the production and testing of a prototype.

Sixteen documents deal with user participation in system development. Fourteen of them find that this factor increases the likelihood of success of AOIS (Debrabanber and Edstrom, 1977; Rivard and Bernier, 1989; Sodeberg, 1989; Yellowlees, 1986), of MIS (Carroll, 1982; Cerullo, 1980; Edstrom, 1977; Gorman, 1982; Markus, 1983; Pinto and Slevin, 1987, 1988; Pliniussen, 1984; Raysman, 1981), of DSS (Meador *et al*, 1982) and of ES (Barcelo, 1988).

One survey of 60 managers shows that user participation in AOIS development does not affect user satisfaction (Senn, 1980), but a survey of 22 studies on the links between this factor and the success of MIS reports different results. In the works consulted, success is evaluated on the basis of various criteria, the most common being acceptance of the system, its use, and user satisfaction. Of those consulted,

- 8 conclude that participation increases the likelihood of success of MIS;
- 7 report mixed results;
- 7 find that participation has no effects or negligible effects on the success of MIS.

One of the 14 studies we mentioned that finds a positive relationship between management participation in system development and the success of those systems is based on a review of the literature on resistance to change (Markus), while seven others report the observations and experiences of their authors (Barcelo; Carroll; Debrabanber and Edstrom; Gorman; Pliniussen; Raysman; Yellowlees) and the other six are based on surveys.

## Table XVII

Factors affecting AOIS performance, rel	ated to	implement	ation prod	edures
(development and	l follow-	up)		

			AO	DIS				E	<b>.</b> C:	S				_	ML	S				E	s/	DS	S				NE	TV	NO.	KK.		_	
FACTORS	1	2	3	4	5	1	2	2 3	3	4	5	1	L	2	3	4	5		1		2	3	4	5	5	1		2	3	4	5	т	JTAL
user participation		<b>ə(1)</b>			+(4)											+(2)	+(6) <u>+(</u> 1)*							+(	2)								16
management participation	+(1)										-	+(1)	)				+(1)																3
prototype					·												+(3)	)															3
control and evaluation	-				+(4) o(1)	+(2)*						+(1	)*				+ (2) m(1)	)						+(	(1)								12
evolving management					+(2)	+(1)*										+(1	) <b>*</b>																4
crisis managment					+(1)												+(1)	)									-						2

1: use; 2: satisfaction; 3: quality of decisions; 4: acceptance; 5: success

+: positive -: négative o: nil c: curvilinear i: indeterminate m: moderate

\*: refers to a literature review

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Three documents find that management participation in system development enhances the use of AOIS (Goldberg, 1987-1988), and the use (Maish, 1979) and success of MIS (Cerullo, 1980). These data are based on the observations and experiences of one author (Goldberg) and on two surveys (Cerullo; Maish).

Three documents find that the production and testing of a prototype increases the chances of success of MIS (Crawford, 1986; Gorman, 1984; Pyle, 1986). These data are drawn from the observations and experiences of Crawford and Gorman, and the four case studies carried out by Pyle.

When the use of a system is standardized too quickly it often produces dissatisfaction among users, who constantly find fault with the system (Crawford). That is why a prototype should be built during the first phase of the project, so that users can try it out and ask for the necessary modifications (Gorman). However, no changes should be made in the first six months of using the system (Pyle).

We have reported the findings of research into three factors related to system development: user and management participation in system development, and the production and testing of a prototype.

User participation in system development is the factor on which the most research has been done and on which the most literature is available. Thirteen studies, including a review of research conducted since 1984, deal with this factor. The latter study is inconclusive (eight positive results, seven mixed results, and seven nil). Our own review of the literature, on the other hand, finds only one nil result, and eleven positive reports. Given the importance assigned to this factor by the authors and the results obtained, sometimes ambiguous and sometimes positive, we think that it must be taken into account in any evaluation of AOIS performance.

Little research has been done showing the effects of management participation in system development and the testing of a prototype on system performance. In both cases, three documents, including reports of personal observations and experiences, case studies and surveys, nevertheless indicate that these factors seem to contribute to system performance. We think that these two factors should also be taken into account in any evaluation of AOIS performance.

#### 2.4.3 Follow-up

Table XVII also shows that three factors are related to the follow-up to system implementation: the control and evaluation of their performance, an evolving management framework, and crisis management.

Control refers to the establishment of means to guide, direct and encourage the efficient use of systems. Evaluation is one of those means. It makes it possible to compare the results obtained with initial projections, to anticipate possible problems, take the necessary corrective steps and ensure that there are no major weaknesses in the systems.

Twelve documents deal with the effects of control or evaluation on system performance. Only one, based on the results of a survey of managers and users in 93 companies, states that this factor has no effect on the success of AOIS (Delone, 1988). All the other works, on the contrary, find that control and evaluation increase the likelihood of success of AOIS (Bolte, 1983-1984; Curley and Pyburn, 1982; Goldberg, 1987-1988; Yellowlees, 1986), of MIS (Cerullo, 1980; Crawford, 1986; Pinto and Slevin, 1987, 1988) and of DSS (Meador *et al*, 1982), as well as the use of ECS (Alavi and Weiss, 1985-1986; Henderson and Treacy, 1986) and of MIS (Ein-Dor and Segev, 1981).

These documents are based on one literature review (Ein-Dor and Segev), one review of research into ECS (Henderson and Treacy), the observations and experiences of their authors (Alavi and Weiss; Bolte; Crawford; Goldberg; Yellowlees), and a number of case studies (Curley and Pyburn; n = 13) and surveys (Cerullo; Curley and Pyburn; Meador *et al*; Pinto and Slevin).

Four documents suggest that adopting an evolving management framework contributes to the success of AOIS (Borko, 1983; Canning, 1988), the use of ECS (Henderson and Treacy, 1986) and the acceptance of MIS (Markus, 1983).

These works are based on one review of research into ECS (Henderson and Treacy), a review of theories on resistance to change (Markus), the experience of one author (Borko) and one survey of AOIS professionals (Canning).

The latter author notes that some companies will probably have to reorganize to adapt to system characteristics and take maximum advantage of their potential. Borko, for his part, considers system design and implementation to be a dynamic process, constantly changing to meet new demands, new employees, new technology and new substantive requirements relating to an organization's mission and function. Accordingly, an evolving management framework is one of the factors capable of affecting system performance.

Two documents find that the ability to manage crises contributes to the success of AOIS (Canning, 1983) or MIS (Pinto and Slevin, 1987), which they explain by the fact that automation projects rarely go as planned. Consequently, the ability to cope with unexpected and disruptive situations can affect system performance.

We have reported the findings of literature on three factors related to the follow-up on system implementation: control and evaluation of the results of the implementation, evolving management framework, and crisis management.

Of these three factors, control and evaluation of the results of implementation seem to be the most influential, not only because of the number of studies and reports on that subject, but also because of their findings. Twelve documents look at this factor, and eleven of them find that it leads to an improvement in system performance. They include one review of research into ECS, one exhaustive literature review, several case studies, and a number of major surveys.

The other two factors mentioned above also seem capable of influencing system performance. One review of research into ECS and a survey of theories on resistance to change, as well as one survey of AOIS professionals, find that evolving management strategies have beneficial effects on the performance of various systems. In addition, two studies find that skilful crisis management also contributes to their performance.

One of these factors (control and evaluation of performance) is a general factor affecting organizational performance, however, rather than a factor specific to AOIS. Accordingly, we feel that any evaluation of AOIS performance should include only two of the three factors related to follow-up, namely the development of an evolving management framework and skilful crisis management, as factors specific to AOIS.

#### 2.5 AOIS performance factors model

In this section we will first synthesize all the factors capable of affecting AOIS performance. We will then identify those that seem to be most influential in that respect. We will

make some comments on the types of research done into those factors, and their relative importance. Finally, we will produce a model of factors affecting AOIS performance, based on the literature reviewed and our remarks throughout this chapter on those findings.

### 2.5.1 Synthesis

All in all, we have reported the findings of studies concerning 59 factors affecting AOIS performance in this chapter. TableXVIII summarizes those factors. It shows that:

## Table XVIII

# Factors affecting AOIS performance, according to the literature reviewed

INDIVIDUALS	ORGANIZATION	TECHNOLOGY	IMPLEMENTATION PROCEDURES
1. Users	1. Physical environment	1. System	1. Planing
Age Cognitive style Education Perception of the project Attitude	Access to equipment Access to equipment Workstation ergonomics	Cognitive ergonomics Response time Processing capabilities User-friendliness of software	Master plan Steering commitee User participation Management participation Identification of goals
Auture Experience in the position Length of service Rank Experience in using the system Training	2. Structure Size of units Size of the organization Centralization Formalization	<b>2. Compatibility</b> With individual needs With organizational needs	identification of users Definition of needs Selection of personnel Modifications to work processes Equipment acquisition
Support 2. Senior managers Decision-making authority Willingness to change	Complexity Stability Flat/tall hierarchy	3. Information Accuracy	2. Development
	<b>3. Procedures</b> Tasks	Relevancy Format Quantity	Management participation Testing of a prototype
Involvement Knowledge of the technology	Communications organizational support		3. Follow-up
3. Project management team	Performance incentives Environmental stress		Control and evaluation Evolving management Crisis management
Skills Relations with users Relations with managers			

- 19 factors relate to individuals; of those, 11 concern users, 4 senior managers and 4, the implementation team;
- 14 fators relate to the organization; of those, 2 concern its physical environment, 7 its structure, and 5 its procedures;
- 10 factors relate to the technology implemented; of those, 4 concern the system itself, 2 its compatibility with individual or organizational needs, and 4 the characteristics of the information it produces;
- 16 factors relate to implementation procedures; of those, 10 concern the planning of implementation, 3 system development, and 3 the follow-up to implementation.

In order of importance, the largest numbers of factors relate first of all to individuals, then to implementation procedures, the organization, and finally, to the technology itself. The factors that seem most influential within each of these four major categories are:

training and attitude, among the factors related to users;

- involvement, among the factors related to senior managers;
- skills and relations with users, among the factors concerning the implementation team;
- access to equipment, among the factors related to the physical environment;
- the size of the organization and the degree of formalization of the automation project, among the factors related to structure;
- organizational support and communications concerning the computerization project, among the factors related to organizational procedures;
- cognitive ergonomics of systems, among the factors related to systems;
- in view of the small number of research studies concerning the compatibility of systems with individuals and organizations and examining the characteristics of the information produced by these systems, we cannot conclude that any factor in each of these categories is the most important;
- the development of a master plan and the identification of project goals, among the factors related to the planning of implementation;
- user participation in system development, among the factors related to that aspect;
- control and evaluation of performance, among the factors related to the follow-up to implementation.

In short, of the 59 factors identified in the literature, 15 seem particularly capable of affecting the performance of AOIS. Four of these factors (the size of the organization, the degree

of formalization of the computerization project, communications concerning the project, and control and evaluation of performance) are general factors affecting organizational performance, however, rather than factors specific to AOIS. TableXIX presents the 15 factors by order of relative importance, ie judging by the number of studies reporting their benefits for system performance. General factors affecting organizational performance are marked with asterisks.

#### Table XIX

## Most important factors affecting AOIS performance, based on the number of studies on their influence

### FACTOR

#### NUMBER OF STUDIES

	Development of a master plan	17
	Training of users	15
	Involvement of managers in the project	13
•	Identification of project goals	11
	User participation in development	11
*	Control and evaluation	11
*	Communications concerning the project	10
	Organizational support	10
	Skills of implementation team	. 8
	Cognitive ergonomics of systems	8
	Users' attitude	6
	Relations between the team and users	6
	Access to equipment	6
*	Size of the organization	4
*	Project training	4

This classification leads to two observations. First of all, we may be mistaken in considering some factors more important simply because more has been written about them. It is

quite possible that some factors are assigned less importance only because fewer researchers have taken an interest in them, or fewer experts have given them any attention.

If the number of studies devoted to the various factors in each of the four main categories is examined, it can be seen that:

- 98 concern factors related to individuals;
- 66 concern factors related to the organization;
- 26 concern factors related to technology;
- 100 concern factors related to implementation procedures.

Does this mean that the latter factors, along with those related to individuals, are the most important factors affecting AOIS performance? Does it mean that factors related to systems are the least important factors affecting AOIS performance? We do not think so. Rather, we feel that given the current state of our knowledge on this subject, all that can be said with certainty is that various experts in system performance have given them less consideration or devoted less time to studying them.

Secondly, it is impossible to conclude that a given factor has overwhelming importance for AOIS performance, because almost no studies have actually measured that performance. Nearly all of the literature reviewed consists, in order of importance, of surveys, reports by experts, case studies and reviews of literature or research that report the results of such research or personal experience. Thus these are mainly subjective data, based on the observations or evaluations of various persons involved in implementing the systems. Moreover, not only are the data collection techniques subjective, but the criteria for evaluating system performance are as well. In most cases, these subjective evaluations deal with subjective aspects of system performance, such as satisfaction or acceptance or, in some cases, in a very vague manner, with their success. Only a few studies on workstation ergonomics have "objectively" evaluated system performance (ie with regard to the number of hours worked, which remains a very marginal aspect in system performance, nonetheless), along with some experiments concerning the quality of decisions based on DSS.

Given the type of research done into AOIS performance, all that we can state with certainty at this time is that there is strong circumstantial evidence to show that some factors are capable of significantly affecting AOIS performance, but that it can in no way be considered that the other factors do not have significant effects on that performance, since their effects have never actually been measured. Furthermore, it can be stated (based on circumstantial evidence) that some factors probably have effects on system performance, but it is impossible to determine the extent of that effect, since it has never really been properly measured. Consequently, it is also impossible to decide on the relative importance of factors, and even less so, it goes without saying, on the combined effects of different factors. It is also impossible to determine the specificity of their effects in relation to a given system, since many authors have failed to note the type of system their research involved. Only "hard" measurements (with regard to data collection techniques and system performance criteria), ones that take into account all the factors capable of influencing that performance and the type of system concerned, could allow us to formulate such conclusions, through painstaking control of the variables involved and multi-variate analyses of the results obtained.

#### 2.5.2 <u>Model</u>

In view of the above remarks, we feel that a model for evaluating factors affecting AOIS performance should include all factors, of any importance, capable of affecting that performance, since only objective evaluation of the effects of those factors can determine their real influence on AOIS. Furthermore, we think that such an evaluation should take into account not only the factors specific to AOIS performance, but also the general factors affecting organizational performance, since they may also have repercussions on AOIS performance.

TableXX presents the model of factors affecting AOIS performance resulting from the review of literature on this subject and the various comments made throughout this chapter. The model contains 40 factors, ie those noted in TableXVIII:

- less three factors that we removed because they are either too marginal (cognitive style), too difficult to evaluate (environmental stress) or irrelevant (stability);
- less five factors that we removed because they are sociodemographic variables relevant to many studies, and not specific to AOIS, although they may also affect AOIS performance (age, education, experience, length of service, rank);
- less ten factors that we removed because they are not factors specific to AOIS, but rather general factors affecting organizational performance (namely all factors related to organizational structure: the size of units and organizations, centralization, formalization, complexity and flat/tall hierarchy, as well as the factors related to characteristics of the job and organizational communications, performance incentives, evaluation and control, and modifications to work processes).

Table XX

## Model of factors affecting AOIS performance

INDIVIDUALS	ORGANIZATION	TECHNOLOGY	IMPLEMENTATION PROCEDURES
1. <u>Users</u>	1. Physical environment	1. <u>System</u>	1. <u>Planning</u>
Perception of the project Attitude Experience in using the system	Access to equipment Workstation ergonomics	Cognitive ergonomics Response time Processing capabilities	Master plan Steering committee User participation
Training	2. Procedures	User-friendliness of software	Management participation Identification of goals
	Organizational support	2. <u>Compatibility</u>	Identification of users Definition of needs
2. <u>Senior managers</u> Decision-making authority Willingness to change		With individual needs With organizational needs	Selection of personnel Modification to work processes Equipment acquisition
Involvement Knowledge of the technology		3. Information	2. Development
3. <u>Project management team</u>		Accuracy Relevancy Format	User participation Management participation Testing of a prototype
Skills Relations with users		Quantity	3. Follow-up
Relations with managers Involvement			Evolving management Crisis management

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To sum up, if we wished to evaluate the performance of AOIS, taking into account the factors capable of influencing that performance, we would have to evaluate 40 factors, of which 13 relate to individuals, 3 to organizations, 10 to technology and 14 to system implementation procedures. Given the type of research done thus far on these factors and, accordingly, the current state of our knowledge on their effects on system performance, any such evaluation of AOIS performance could also include any other factor of interest to researchers.

For such evaluations to be effective, however, they must:

- use data compiled before and after the system is implemented;
- be longitudinal, where possible, particularly with regard to certain factors that have effects only in the long term, such as experience in using the system;
- take account of phases in the project, since according to Pinto and Slevin (1988), the importance of some factors could vary depending on the project phase (which also argues in favour of longitudinal evaluations);
- use objective performance criteria in evaluating the system (quantity, quality, rapidity, degree of achievement of individual, departmental or corporate objectives, and so on).

For such evaluations to be worthwhile, statistical analyses should also be used to determine the relative importance of the different factors analysed, as well as the combined influence of various factors. This procedure would make it possible to eliminate certain less influential factors, and finally to produce a more elegant and workable evaluation matrix.

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