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2. **WORK AND NEW TECHNOLOGY:**

SOME THOUGHTS ON THE EFFECT OF OFFICE AUTOMATION ON PRODUCTIVITY AND THE PROCESS OF CHANGE

Canada

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SOME THOUGHTS ON THE EFFECT OF OFFICE AUTOMATION ON PRODUCTIVITY AND THE PROCESS OF CHANGE

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NOTE: The views expressed in this report are those of the author.

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INTRODUCTION

One of the topics frequently addressed in discussions of office automation is the relationship between its cost and potential advantages. Conventional management thought is that new technology enables companies to make gains in productivity; hence the magnitude of investment in office automation equipment. Greater productivity is the benefit that justifies the cost.

Various studies have shown that technological change in industry does indeed mean that workers take less time to produce a given amount; it is expected that micro-processors will continue to bring about improvements in industrial productivity over the next few decades.

Post-war innovations in electronics - the use of computers for the mass processing of information - were also the reason for a rise in the productivity of administrative workers; batch processing has been replaced by interactive and distributed processing.

However, with the introduction of office automation on a large scale and, consequently, the pressure of new information technology, it seems that the productivity issue no longer means quite what it once did. Technology is increasingly being applied to non-repetitive tasks, in other words, to managerial, supervisory and secretarial duties only portions of

which lend themselves to automation. Technology is spreading to all levels of management and being incorporated into every sphere of corporate activity.

Nevertheless, we continue to use a conventional concept of productivity, one where technological investment is still regarded as a substitute for investment in labor. The truth of the matter is much more complex since, in addition to taking the place of labor, technology is being superimposed on it; in other words, technology is often found alongside existing operations. This fundamental change in the very nature of technology probably helps to explain why, at the moment, most companies are finding it difficult to assess what productivity gains have actually been made. Moreover, office workers, unlike their manufacturing counterparts, rarely turn out a clearly defined product, thereby adding to the difficulty of quantifying output.

CHAPTER 1 - WORKER PRODUCTIVITY

The measurement of productivity was traditionally a manufacturing concern, where input was compared with output over a given period of time. We spoke in this framework, for example, when attempting to determine the number of units produced in an hour and hence referred to components that were readily identifiable.

Subsequently, an interest began to be taken in office work, primarily in the output of individual members of secretarial staff - for example, the number of lines of typescript, the number of telephone calls taken, and so on. More recently, studies have evolved assessing improvements in productivity resulting from the use of office automation equipment.

If we use word processors as an example, we can see that the automation of certain repetitive features of simple typing makes it possible to produce a greater volume of work with the same number of people. Here too productivity gains have been made, varying with the type of machine in use and operator skill.

Generally speaking, these productivity gains are largely associated with the degree of specialization. In this case, the more repetitive the task, the greater and/or more measurable the

productivity gain. To standardize tasks, people have looked to the production methods used in industry, an approach that has caused the proliferation of word processing pools.

Reasoning such as this derives from Taylor's view of work organization: that machines increase production and make the individual more disciplined and dependent by reducing down-time in the production process.

This way of thinking reflects only part of the situation. The true state of affairs is much more complex and the person-machine relationship raises a number of questions. We may think, for example, that the more repetitive the office task, the less the machine potential can be maximized, since not all of its functions, particularly the more sophisticated ones, are used. The same thing occurs when people are hemmed in by the demands of conventional profitability; only partial use is made of their abilities. Needless to say, such an approach pays scant attention to individual satisfaction or quality of working life as a variable in the analysis of productivity improvements.

If we consider current developments in the workplace, we realize that the effect of office automation is not only to alter the nature of the individual's duties, but also to alters the nature of his or her production. A word processor makes it possible to improve the

presentation of the information or to devise new applications for files, new methods of calculating and so on. Office automation thus fosters diversification of production by offering new products and new services. We may feel, however, that a large portion of productivity gains in the conventional sense of the term are offset by the changes in the services requested of office staff.

Though we generally tend to regard the operator's duties as a passive part of the production process, new information technology is enabling secretaries, because of the expertise which they develop, to play an active role in product design; this means job enrichment for some of them. Secretaries are gradually turning into administrative assistants and sharing in some executive duties, particularly those concerned with the computerized management of business or the introduction of new forms of information processing.

Automation of office work is therefore accompanied by a change that links a higher level of output for the same number of employees to a different product and a different mode of production. The entire production process is turned upside down. It is difficult in such a context to take quantitative measurements before and after the automation of the office. Traditional measuring instruments and traditional ways of thinking are becoming increasingly unsuited to the task and the conventional work station approach seems outmoded.

Moreover, gains in effectiveness, a qualitative variable in labor production, are beginning to emerge alongside conventional productivity gains in efficiency. Since the component parts of a task (job design, product or service type, and the organizational environment) change with the introduction of office automation, new variables must be included when quantifying change. The complexity of the situation has been represented by Roger Nesme in a table comparing office work and manufacturing activities (see Figure 1 on page 15).

Secretarial work accounts for only a fraction of office operating costs; hence the importance, as many people have emphasized, of also increasing the productivity of executive and professional staff. Confusion reigns, however, when it comes to assessing the productivity of such employees, and the problems of measuring it are legion. We cannot be content, for example, to evaluate a manager on the basis of the number of decisions made in a day, since the purpose of the decision and the achievement of the objective are just as important.

Though the work of managerial and professional employees may not lend itself to automation, the technologies to be found in an automated office can help them perform more efficiently. In addition to data processing, information management by means of voice and text transmission will prove vital in developing a system to help in decision-making. The integrated work station should eventually incorporate a range of features including access to files, data handling, simulation exercises, decision aids, time management, co-ordination of meetings, electronic mail, and voice communications.

CHAPTER 2 - CORPORATE PRODUCTIVITY

The advent of office automation has confirmed the leading role that information plays in office work, and information processing is regarded as a central activity of the organization. The importance of information, its generation, storage, processing and transmission, is demonstrated by:

- the increase in the amount of information as a result of increased contacts inside and outside the organization;

- the existence of different information media in one place (paper, software, disks, floppy disks, cassettes and so on);

- the varied nature of communications (written, oral, visual);

- the expanded use of internal and external data banks.

From the corporate point of view, office automation now encompasses all tools that contribute to greater productivity and better performance in the office. The organization will therefore attempt to achieve productivity gains by shifting costs; that is, by delegating tasks to machines (electronic mail, word processing, data base management, electronic messenger service, decision aids, and video-conferencing).

Productivity in an organization thus becomes linked to the ability to circulate information and generate the knowledge that will enable the company to better manage itself. On the other hand, information in such vast amounts can become a serious problem given the cost of processing it. Increased productivity then becomes even more important.

Office automation is now revealed in all its complexity, since it is seen to be not only a set of tools, but also an organization technique that transforms the production process.

In our opinion, the methods for analysing office productivity after the introduction of automation should not, therefore, merely measure developments in the productivity of each work station or each individual. To determine the effects of information technology on productivity, we must rather assess the overall rise in productivity in a unit or organization, since the gains are systemic gains.

It may have been appropriate to talk in terms of efficiency in the first phase of office automation, when what mattered most was that time be saved. Now that we are talking in terms of systems, however, greater effectiveness must be the target of corporate development strategies. In future, the idea of effectiveness will encompass "doing the right things" to achieve goals, as well as "doing things right."

Moreover, effectiveness is the primary goal of investment in new information technology. It is success in terms of overall corporate objectives that is sought, not effectiveness at individual work stations.

Consequently, the ultimate aim when introducing new information technology should be to improve corporate performance, in terms of either achieving internal objectives or increasing market share.

The question of the productivity of administrative staff thus demands complicated analysis, since the pressure of new information technology turns production into a collective effort. Previously, money was invested in machines in order to produce more; now, investment in new information technology makes it possible to produce in a different fashion and compels business to rethink its structure and the nature of the product and service it provides.

It is essential for the organization to look beyond its preoccupations with efficiency and return on investment that often lead to reductions in the labor force. It should concentrate on improving both the quality and the quantity of output.

The thrust of this new approach should be to measure the overall improvement in the organization's productivity. It therefore requires administrators to opt for a comprehensive view of the role and functioning of the organization, the state of the market, and opportunities for technical and organizational innovation. Strategic planning combined with office automation should ensure corporate success in the year 2000.

CHAPTER 3 - ORGANIZATIONAL CHANGE AND INNOVATION

In addition to being compelled to reconsider the scientific concept of labor and a conventional approach to productivity, companies that have automated their offices must also show great flexibility. They need to bear in mind that office automation may well trigger innovation.

An impressive number of innovations are being proposed by people further down the hierarchy. These innovators, who are in charge of the new technologies that have been introduced, are suggesting new products and production methods that often affect the organization of work and interfere with reporting relationships. "Trickle up" strategies tend to trample on what was once sacred ground.

There is also some overlap between the innovators in a company and its computer services. Some applications may, for example, be decentralized but still be part of a central information processing system, while others may be the responsibility of different units in the organization.

A range of practices can thus co-exist for some time before senior management takes a stand in favor of one or the other of them. While the central information processing service tends to pull innovations back into the corporate "womb," the other units are

struggling to maintain their independence, and in the process may be creating a major source of tension within the organization.

It would seem that, during the transitional phase, the internal operating practices of an organization are frequently called into question without any new frame of reference being supplied to take their place. Senior management then has to act as referee, allowing change while evaluating pilot office automation projects for their ability to meet the economic objectives of the organization.

Innovations are also occurring in business management. Companies need to manage innovation and, consequently, monitor experiments and the costs and economic advantages of an application, and assess its impact on the product, the organization and so on.

Innovation is thus one of the challenges now facing business, an integral part of that challenge being the need to manage change. On the one hand, company management is forced to lend its support to innovators since what they are doing, disruptive though it may be, is often in line with the economic objectives of the company. On the other hand, management introduces controls by, for example, setting up an information systems branch to assess and disseminate the innovation. It must also rely on middle management whose job is to give the seal of approval to an innovation before it gains acceptance within the company. This is the setting for gauging the worth of the innovative work associated with office automation.

It is to be expected that, in addition to overthrowing established procedure, the acquisition of expertise in information technology will have a significant impact on reporting relationships. If information is indeed power, then power may well be questioned, since new information technology means a structural re-organization of the way in which information is exchanged, handled and disseminated. This might lead to a situation where all levels of management are more involved in the decision-making process since information may now be found throughout the organization, thus contributing to a change in the power games.

We would add that the acquisition of expertise in new information technology may also have an impact on the opinions, views and value systems of individuals since technological innovation has led people to ask questions about routine work and, by the same token, about the way in which that routine work is perceived.

Lastly, we may postulate that the introduction of technological change is characterized by greater uncertainty on the part of the organization and the various players and thus by a change in the power struggle; it is also characterized by a tendency to "debureaucratize" the system before another form of control takes over.

CONCLUSION

Technological evolution may be said to have gone through three main phases:

- the technical approach, taken in the early days of computer science and computer rooms when information processing was a centralized function. There was a strong division of labor between software designers and computer programmers when mass processing was done by giant computers.

- the early 70s saw the management approach take shape, one that is still being taken by a good many companies today. The objective of such an approach is not only to increase the volume of information processed but, first and foremost, to increase productivity. Routine tasks and the design of special applications tend to be decentralized.

- with the development of office automation in the early 80s came the organizational approach. The objective here is to produce the information the company needs in order to operate and also to increase corporate productivity by improving the quality of the information product and the quality of communications inside and outside the company. New information technology seems to be essential to corporate productivity but not, however, sufficient to guarantee it, since a good dose of creativity is needed in order to maximize machine investment.

The advent of office automation conceals a technological, economic and social revolution that is only just becoming evident. There is now a trend in companies toward:

- a greater decentralization of day-to-day decisions since a greater number of people are able to take part in decision processes because they have more information;

- a need for greater versatility on the part of executives, secretaries and so on, and more extensive co-operation between them;

- changes in the structure of the hierarchy because of a reduction in the ranks of middle management;

- a blurring of the distinctions between units because of greater co-operation among experts in various fields;

- a growing gap between the status, title and actual duties of a position;

- "after the fact control" over the work done since innovations in the use of technology are accompanied by a more detailed evaluation of the contribution made by each person to the collective product.

We would conclude by stressing that effectiveness lies less in machines than in the use made of them. Technology is rarely exploited to its full potential, however, and this poses major challenges for organizations.

FIGURE 1*

	INDUSTRY	OFFICE
PRODUCT	- concrete - homogenous	- abstract - numerous exceptions
OPERATING MODE	- structured - standard - few pointless tasks	- empiric - numerous pointless tasks
MATERIAL USED	- mechanization - automation - knowledge of costs	- virtually no mechanization - little automation - no knowledge of costs
SCHEDULING	- time measurement - knowledge of charges	- no time measurement - little knowledge of charges
QUALITY OF WORK	- defined level of quality - rejects allowed - quality control	- concept of tolerance unknown - no rejects - uneven control (ranging from casualness to perfectionism)

* Roger Nesme, taken from Jean-Paul De Blasis, Les enjeux clés de la bureautique, Les Editions de l'Organisation, Paris, 1982.

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