

# OFFICE AUTOMATION IN THE SETTINGS OF JAPANESE COMPANIES†

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## I

The remarkable performance of Japanese firms during the past two decades including both the period of high economic growth in 1960's and that of stagflation triggered by the first oil crisis in 1973 can be, to a great extent, attributed to a series of business innovation campaigns conducted under the banner of various acronyms, e.g. QC, OR, VE, ZD, MIS, etc. Each of these acronyms, when used successfully, functioned effectively as a slogan under which employees of all echelons from top to bottom were got involved in related innovative activities. The most conspicuous example of success is QC, which has been nowadays developed into its extended version, TQC. Heavy dependence on campaign slogans for enhancing employee involvement in performance improvement activities can be regarded as one of salient characteristics of Japanese firms.

It is quite interesting to note that these acronyms are usually either only vaguely defined or not given any definition commonly accepted by the people concerned. For example, TQC is loosely conceptualized as a collection of companywide activities aiming at the assurance of the product quality to the full satisfaction of customers. Defined in this way, TQC can be regarded as rather a philosophical slogan than a specific management technology. In order to mobilize a wide range of people, it is better the slogan used be defined vaguely rather than strictly, so that participating people can interpret its meaning as they like. Thus the participants are motivated to translate the general guidelines contained in the slogan into their own specific action programs, being stimulated to think creatively.

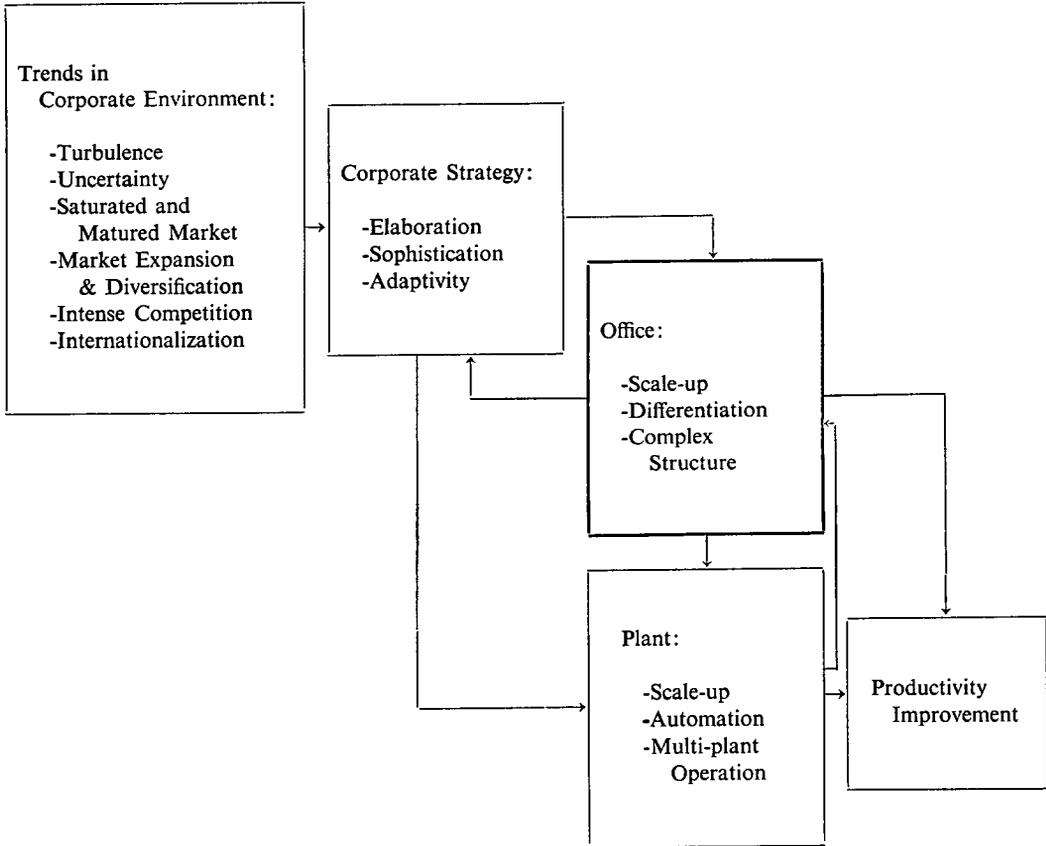
The current enthusiasm for OA among Japanese firms, although it has been driven to a great extent by the commercial efforts of OA equipment manufacturers, can also be recognized as one of a series of business innovation campaigns. In the background of the present OA fever, there are new technological developments of microelectronics and telecommunication on the one hand (supply side), and a general recognition, on the other, that office productivity is lagging far behind factory productivity (demand side). Technological progress in the past several years has really been impressive enough to raise up our expectation of what is possible in the future office. And it is also true that there is much room for improving office productivity. Therefore, it is quite natural that the office has been focussed as the last major innovation area left to be explored.

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† This is a revised version of my paper presented to the Japan-U.S. Office Automation Forum '82 held in Tokyo, November, 1982.

FIG. 1 PRODUCTIVITY DYNAMICS



However, one comment should be made before proceeding to the main discussion. We must be careful in evaluating such statement, for example, that the productivity of office workers increased only 4% during the decade 1970's, while that of factory workers increased more than 90% in the same period. Production of goods or services is accomplished by the joint contribution of both factory and office workers, and the two kinds of labor are highly substitutive each other as inputs to the production system. For example, productive manpower saving by the automation of production facilities will not be realized unless it is accompanied by an increase of office workers who plan, design and manage the automation project. The rise of capital intensity, reflecting the increasing plant-size, multiplant operation, automated factory, etc., has been supported by the increase of office workers dealing with the more complex management and business strategy. Thus, the increasing office population is an inevitable trend in the dynamics of productivity improvement.

Figure 1 shows the causal structure of the dynamics of corporate productivity. The corporate environment today is characterized by accelerated changes and unforeseeable events. The economy and market in advanced countries have reached to a highly matured

and saturated stage. The market has expanded into a huge one, but at the same time has been diversified to a great degree into many differentiated segments. The competition has been intensified both domestically and internationally. International operation has become commonplace for most of companies.

Such general trends in the corporate environment demand more and more elaborate and sophisticated corporate strategies and programs, requiring more efficient and effective information and data processing capabilities. With the growth and extension of the market, the company's production arm scales up and tends to be scattered geographically. Efforts are made to modernize or automate plants to raise up labor productivity. But all these efforts to manage a large-scale complex organization in the new environment leads necessarily to an aggrandizement and sophistication of the supporting office.

It goes without saying that the above comment does not mean that we have to accept the corpulent office as it is. It is beyond doubt that a great deal of technology for improving office productivity already exists and is still developing rapidly. Office automation, in whatever sense the term is used, can be regarded as an effort to apply such new technology for that purpose.

## II

The office is the last major area left to be innovated, but it is no easy task to accomplish the innovation. It is the place where people working are mostly highly educated, intellectual in mind, sensitive to culture and changing values, and demanding humanistic identity. The introduction of a new technology will inevitably change the kinds of skills required for office works, and therefore influence people's behavior differently depending upon their perceived adaptability to the technology.

In the past, Japanese companies experienced and managed successfully a very rapid rate of technological change which could not be achieved in the West because of the strain such change would place on employees and trade union relations. Under the Japanese system of "permanent employment" and company union membership which is undifferentiated by skill, high job flexibility could be maintained and new technology does not threaten the employment of workers. Usually, the workers whose job is taken over or whose skill is made obsolete by a new technology are transferred to other jobs after required retraining. Therefore, new technologies can have only positive benefits to workers as well as to the company if they are introduced effectively.

In the case of the West, however, where job changes require a renegotiation of contractual commitments, new technologies which displace particular jobs or obsolete present skills are a threat to the work force. A recent study conducted in Netherland on the acceptance of robot technology reported that some employees were resisting like the Luddites in the 19th century and the most common forms of sabotage were to slow down the robots by feeding them parts in the wrong order, to repair the machines incorrectly, to mislay essential spare parts, or to put sand into the robots' lubricating oil.

Japanese companies have been free from various constraints on the introduction of new technologies and have not suffered from such Luddite type resistance. But this applies mostly to the case of production technologies, and the situation might be a little bit different

with regard to the new office technologies. In the case of factory automation, resistance is rather visible and relatively easy to recognize. Works are organized and synchronized orderly and systemically, and a social pressure from peers is nearly irresistible especially where work performance is evaluated on group basis. But in the case of office work, work contents are more subtle and invisible, and jobs are very often more isolated and more loosely controlled, so that resistance can be made more imperceptively. New office technologies might be seen as a threat to office workers because they may fundamentally alter the nature of office work, bringing out a work environment unfamiliar to them. Therefore, to take advantage of the potential of new OA technologies, and to introduce the technologies into the office without inviting any substantial resistance on the part of the people working there, we have to carefully assess the possible impacts of OA on people and organization.

For the purpose of assessing the impact of OA technologies, it may be useful to know what are the expectations and concerns of companies and labor unions. The results of a survey conducted by the *Nikkei Business* (68 companies and 38 labor unions) are shown in Figures 2 through 6. It can be pointed out here that, both companies and unions have favorable expectations towards OA, but generally speaking, companies seem to be more optimistic about the possible benefits of OA. It is also noted that there is a considerable concern about the adaptability of workers especially on the side of labor unions.

FIG. 2 EXPECTATIONS—COMPANIES

Effective utilization of manpower	75.0 (%)
Coping with technological innovation	41.2
Reduction of personnel costs	32.4
Improvement of work environment	17.6
Improvement of product quality	14.7
Shorter labor hours	8.8

FIG. 3 EXPECTATIONS—LABOR UNIONS

Reduction of simple labor	68.4 (%)
Reduction of tortuous labor	50.0
More time for workers to develop skills	31.6
Increase of vacation	18.4
Higher wages expected	13.2

FIG. 4 FEARS—LABOR UNIONS

Increase of unadaptable workers	65.8 (%)
Increase of work alienation	52.6
Intensification of labor	23.7
Increase of job changes and being sent to subsidiaries	18.4
Undermining the seniority-based wage system	7.9

FIG. 5 HOW TO DEAL WITH REDUNDANT WORKERS?—COMPANIES

Reallocation of workers to other departments	45.5 (%)
Reallocation to new business	20.6
Reduction of recruitment	11.8
Others	7.4
N.A.	14.7

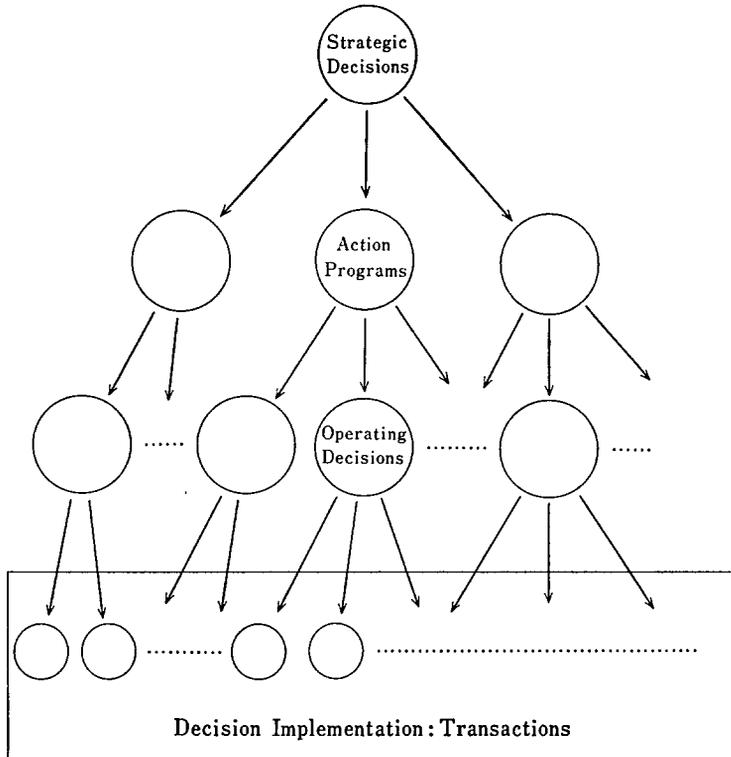
FIG. 6 ARE WORKERS ADAPTABLE?

Completely adaptable	Companies	26.5 (%)
	Labor unions	0
Difficult in some areas	Companies	42.6
	Labor unions	34.2
Difficult for higher age workers	Companies	19.1
	Labor unions	50.1
Become difficult in future	Companies	4.4
	Labor unions	10.5
Some difficulties already observed	Companies	0
	Labor unions	2.6
N.A.	Companies	7.4
	Labor unions	2.6

### III

The automation of the office function is no easy task, being far more difficult than that of manufacturing processes because office works are less structured and systemic than production works. Most of office works are only loosely synchronized and coordinated, depend-

FIG. 7 An Analytical Framework of the Business Process



ing to a great degree upon the mechanisms which Mintzberg classified as mutual adjustment and direct supervision. However, it is also true that a fairly large part of clerical works is well structured and repetitive, and the traditional "office-mechanization" efforts have a long history ever since the appearance of punched-card machines.

Office automation today is, of course, aiming at going far beyond "office-mechanization" of well-structured works into semi-structured or ill-structured office operations. And for that purpose, it is essential in the beginning to consider what are the basic office functions and processes and what kinds of people are working there.

Figure 7 shows a view of the business process for providing a framework of the following discussion. Here we differentiate three levels of decision-making; strategic planning, action programming, and operational decision-making. And down in the bottom, the implementation process involving business transaction activities is shown. A strategic plan, which is the output of strategic decision-making, provides the basic guidelines for the procurement and deployment of company resources. The plan must be translated into action programs which specify who does what at what time, that is, action plans for various organizational units over a certain period of time, with resources allocation being explicitly attached. These action programs are executed in the daily business operations through operating decisions. A large part of these operations are put into action based on some standard operating procedures (SOPs), but there are also many operations for which no

SOP is available and therefore an *ad hoc* judgement of the manager or the executor must be made.

In this framework of the business process, the basic functions or activities taking place in the office can be classified into the following three broad categories;

1. transaction processing,
2. data gathering and processing for planning and decision making, and
3. coordination for decision implementation.

And these functions are carried out by three kinds of people in the office; clerical staff, professional staff, and managers. It should be noted that there is only rough correspondence between these three functions and the three kinds of people.

Transaction processing includes various data processing works related to logistic activities (procurement, production, and marketing) of the firm, e.g., order processing, cost accounting, inventory control, etc. The volume and complexities of transaction processing are a function of the volume of business, expansion and differentiation of market, business strategies (e.g. diversification, market segmentation), etc. The main job of the clerical staff estimated to compose about 55 to 60% of the office population is such processing activities.

In the case of organizations such as banks and insurance companies in which transaction processing is a big part of the operation, there is a great population of clerks and cashiers, and the office is just like a factory. Therefore, OA means much the same as factory automation (FA) does in a car manufacturing plant, and actually OA has been progressed to a great extent. For example, the introduction of CD (cash dispenser) has changed the picture of the counter in bank branches, decreasing the number of tellers dramatically.

The second function of the office, data gathering and processing for planning and decision making, is performed by professional staff, such as business economists, accountants, operations researcher, etc., with substantial assistance of clerical staff. In Japanese firms, the status of the specialists who perform these kinds of jobs has not been well-established. Under the life-long employment system, most of the people prefer to be a generalist climbing up the organizational ladder rather than a specialist working as a staff to line managers. However, with complexities and sophistications of business planning, reflecting the need for more systematic and adaptive business strategy, this function has become more and more knowledge-intensive and requires sophisticated analysis and information handling. The increasing proportion of professional staff in the office population has been brought about by this inevitable trend, as well as by the increase of college graduates.

In this function, office work is quite often an ill-structured system of operations which are loosely connected in the sense that some of them are interchangeable in sequence or can be omitted by discretion, and so on. It is mainly in this area that office work is said to be semi-structured. For the improvement of performance in this area, new technologies of desk top-intelligent workstations, stand-alone or networked type, supported by easy to use softwares and well-designed and maintained database, will be of great help. The development of DSS's (decision support systems) and office-oriented languages is the most promising task in this connection.

Most of the communications taking place in the office are coordination. Modern complex organizations require a great deal of coordination activities to synchronize various organizational actions and to make many subunits' decisions and actions congruent to the over-all organizational goals. Telephones, face-to-face talks, meetings and conferences

are extensively used for this purpose. Plans also serve as a coordinating tool because conflicting requirements of organizational subunits should be mediated during the planning process.

In the Japanese way of management where the concensus among the people concerned is highly respected, the amount of coordination required is a lot more than in the management systems of other countries. For example, the preparation of the 'ringi' paper, which is a widely-used tool of concensus making in Japanese system, is often a very time-consuming coordination process. New office technologies, such as electronic mail and teleconference, will be able to contribute a great deal to make such coordination process more speedy and less costly. Heavy people involvement and lack of structure are the basic characteristics of this process which will be subject to little change even in the electronic office of the future, and therefore, new technologies should be of the nature to help towards making human communications more efficient and effective.

#### IV

I am rather optimistic about the future of office automation in Japanese companies, but I think I have to emphasize that a successful introduction of new office technologies will depend very much on the sensible handling of human and organizational problems. In this connection, it is important to consider the problems in the light of the characteristics of Japanese companies, especially their management and office systems.

In brief, the Japanese office system as a work organization can be characterized as a loosely integrated, group-based system. There, formally distinct and well-defined positions are often indefinite and vaguely defined functionally. Line and staff functions are not always clearly differentiated, and there is a wide use of deputy managers or assistants whose authority is rather ambiguous. In such a loose authority structure, most of decisions are worked out by groups of people in conference. This is surely a time-consuming procedure, but once the decisions are made, the implementation is speedy and secure because people have the feeling that they participated in the decision-making process.

I believe that the Japanese system and people are flexible enough to adapt to the coming office innovation successfully. And there will be a Japanese way of automating office, considerably different from that of U.S. or other countries, even utilizing similar or same technologies. For example, relative roles of man and machine will be considerably different between the Kanji and Kana culture and the alphabetical culture. But anyway the full benefit will not be realized unless we prepare ourselves for the changes anticipated to occur. Some of the important issues which can be raised are;

What are the effects on the nature of workplace, the psychology of people, and the social structure among them?

What are the effects on the traditional way of group decision making?

What are the effects on the management control system?

There is a fear on the part of office workers that the electronic office may increase the measurability of their work and change traditionally loosely controlled office work into tightly synchronized one, thus limiting freedom and bringing about what C. Wright Mills called "psychological exploitation." There is of course still much room for "automating"

office work, but it is also true that the office should always provide a free space for human inspirations and creative works. It must be asked whether the future office will really be both productive and humane one.

The new office technologies will also have an important impact on the social structure and interaction among the office people. There is a study reporting that people working in automated environments tend to feel under constant pressure to keep up with their electronic partners, and have a sense of uncomfortable isolation. Anyway, there will be a significant increase of what Shoshana Zuboff called "computer-mediated works," and it will influence the office workers' psychology in various ways. Some of the influences may be dysfunctional, deteriorating peoples' motivation and morale, unless the new technologies are appropriately handled.

In the general settings of Japanese companies where the psychology of the working people is highly respected, I think most of the dysfunctional effects could be avoided for the benefits of the future electronic office. The psychology of office people will demand a free flow line type of automation where workers are allowed to control the flow speed of the automated production line. Office works form a network rather than a line, and work flows in the network are often ill-structured and loosely coupled. This means that office automation, unlike the case of factory automation, can be proceeded in a fragmented or piecemeal way, as well as in a systematic way. Therefore, the future office will be a loosely automated workplace involving many man-machine interfaces, and the successful utilization of new technologies in the future office will depend not so much on machine capabilities but more on the willingness of office people (clerks, professionals, and managers) to use the machines.

In the Japanese environment where employee involvement is emphasized, the introduction of OA technologies will proceed with due consideration paid to people problems. But on the other hand, it should be recognized that how readily office people will accept new technologies will depend on how responsive the new technologies are to peoples' needs, and in this connection, the role of softwares especially dealing with man-machine interfaces cannot be overemphasized.

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\* All of the papers 1 through 6 were presented to the Japan-U.S. Office Automation Forum '82 held in Tokyo, in November 1982.