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25. Policy Implications in Implementing Office Systems Technology*

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INTRODUCTION

Office use of new communication systems is growing at an unprecedented rate. Projections call for 40 to 50% of the U.S. information workforce to have workstations by 1990—32 to 38 million workstations with an average investment of $25,000. More than 400,000 word processing units are expected to be delivered in 1984 (IDC, 1980). This rapid diffusion has led many to ask, "Can policy keep up with technological change?" In this paper we point to three policy issues of interest to decision makers in public and private organizations.

The research reported here was funded by the National Science Foundation, specifically by a group formerly called Policy Research and Analysis, now the Productivity Improvement Research Section. One of the group's program directions is the study of adopting technologies within organizations. We proposed policy implications involved in system procurement, guidelines for use, job design and compatibility/standardization.

We interviewed by phone respondents from 194 organizations in the San Francisco, Washington D.C. and Oklahoma-Southern Kansas areas. 24% were public, 15% private-nonprofit, 53% private-profit, 8% regulated (for more detail on survey methods and conclusions, see Johnson et al., 1982; Johnson, Rice and Taylor, 1983). We are in the process of visiting 60 of these installations to conduct interviews with, and to survey operators, managers, and authors.

IMPLEMENTATION HISTORY

Regardless of their size, organizations tended to follow a similar pattern. At 61% of the sites, one executive, sometimes with the approval of a committee, initiated word processing (wp) and was responsible for implementing it. At only 10% of the sites did the idea originate with office services or clerical employees. Where executives initiated, they also selected the number and type of

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equipment purchased, usually consulting little with potential users. Having made the decision to acquire wp equipment, they appointed a supervisor to manage its use. A female (70%) was selected from within the organization (92% of the time) and a center (80%) was formed. 56% of supervisors had no background with the equipment; 90% had no managerial experience. Operators, often people with low seniority, were recruited from within the organization.

Word processing systems were brought into organizations with little planning. Whenever new technology is introduced, people tend to see it as "horseless carriages"—new means for doing old work—rather than as new ways to work. In our sample fewer than one-third of the organizations had studied work flow or how employees might be changed by the new technology. Procurement concerns focused initially on the generic issues of equipment choice —how much it would cost and whether it should be leased or purchased. However, as organizations added, upgraded, or otherwise changed their equipment (89% have), vendor training, maintenance, and ease of application development received more attention. Further, in the last two years, most large organizations have adopted internal policies aimed at insuring compatibility among machines.

Our study of implementation history confirms that in office systems, as in other fields undergoing substantial technological change, implementers are naive.

SYSTEM PROCUREMENT AND GUIDELINES FOR USE

Implementers have developed considerable sophistication in procurement. Federal policies have changed and now encourage federal agencies to procure large numbers of machines at one time to secure favorable bulk prices and compatibility among the machines. Several agencies in our sample had just completed such procurements. Moreover, justification is not solely based on hours of equipment use. In a federal standards document (NBS, 1980), managers are directed to determine the "key products" of their units and to measure the level of effort required by various kinds of employees to complete it. Level of effort and employee grade level are key factors in determining whether automation is justifiable. Thus, we do not find that procurement *per se* is an issue for policy concern for the next several years.

However, we are concerned about "procurement myopia." The NBS document illustrates the attitude we have found in many organizations, both public and private. Chapters 1 to 5 discuss how to conduct analysis to justify procurement; Chapter 6, how to conduct a post-implementation audit. Government reports emphasize procurement analyses. One (GAO, 1981, p. 1) states, "Office automation is not likely to produce significant benefits when equipment is installed as a general purpose tool, or to compensate for basic systems deficiencies." In the federal government (and in other organizations) there are incen-

tives for procurement. The incentives for day-to-day management are less clear. The need for good day-to-day management is mentioned, but few guidelines are provided. Yet, word processing history shows that management is far more important than prior justification. People have difficulty imagining exactly how they might use the new systems. Frequently, respondents mentioned work products that had never been produced before because they were impractical but which became key products. Over and over again, it was the uses that evolved through adaptation and "reinvention" (Johnson, Rice and Taylor, 1983; Rice and Rogers, 1981) rather than those anticipated in the cost justification (if there was one) that proved to be the key to productivity. This is consistent with the findings of Peters and Waterman that excellent companies have an orientation to action—they act and then adjust rather than plan and rationalize (1982).

Our research suggests that the following principles contribute to good management of office systems:

1. *Experimentation.* Tell employees they are expected to develop new ideas and procedures; provide rewards, especially recognition for those that do.
2. *Flexible procedures.* The learning curve goes through an initial phase of confusion. Automated systems require agreements about issues such as formats, codes, priorities, and time lines. These structures can provide a framework for creativity, but they can also stifle it. Managers need to help people understand the reasons for procedures and the room for growth they provide.
3. *Training.* Few respondents found vendor training useful beyond an introduction to equipment, although the vast majority (86%) were indeed first trained by vendors. Training by peers, on the other hand, was seen as "very useful" both initially and for advanced training. In 47% of the responding sites, only lead wp operators were trained on the new equipment. However, *new* operators were trained by supervisors (43%), experienced operators (48%), vendors (20%) or else they learned by themselves (19%). 59% of respondents reported continued in-house training was "very helpful" as opposed to "not" or "somewhat" but only 20% felt continued vendor training was very useful. The highest percentage response was that co-worker training (64%) was "very helpful." Many reported on-the-job training as the only kind their organization would support; yet no one reported "co-worker training" as part of the job description of system operators. Training increases employees' choices about how to solve problems. Respondents tended to evaluate training poorly if machine compatibility was poor, and the contrapositive (d.f. $=4$, chi-square $=13.4$, p .01). As systems become more integrated and complex, good management will require devoting resources to training, and including peer training in job descriptions.

4. *Self-regulation.* Measures of productivity can provide feedback to employees about their performance and can be used by them to improve their work. We found considerable interest by operators in high performance. "Verbal praise" and "pride in personal accomplishment" were mentioned when respondents were asked about motivations other than pay, the work, career mobility, autonomy and relationships with coworkers. Measures of performance that promote self-regulation were not found in many organizations. Some specifically mention discontinuing line counts because they were cumbersome and invalid; although many centers (51% regularly, 13% occasionally) track turn-around time; some keep the figures prominently posted as an indicator of "running at speed."
5. *Support for Communication.* Those with informal contacts around the organization have a better perspective on what work needs to be done and how to get help when they need it (for example, to get programming or repair in an emergency). We found considerable evidence that where few staff have useful informal organizational contacts (as opposed to "some"—39%—or "most/almost all"—48%), subsequent changes in wp jobs and applications were infrequent (43%) or more controlled (14%) as opposed to creative changes and improved work conditions (d.f. $=4$, chi-square $=11.6$, p .03).

JOB CLASSIFICATION AND DESIGN

We began the research with a quasi-engineering conception of how jobs were designed; we were concerned that office systems engineers were de-skilling previously diversified office jobs (Downing, 1980; Glenn and Feldberg, 1977; Rice, 1980). We found very little engineering of any kind, and less reason for concern about de-skilling than we anticipated.

In a few organizations, systems engineers had installed "work measurement" systems and designed wp operator jobs like production work. These were among the least adaptive sites in the sample. Most large organizations introduced word processing by "rationalizing" office work into typing work (indeed the first rationale for implementing wp, noted by 66% fo respondents, was to handle repetitive typing) and administrative support and creating large centers of forty to sixty operators. Their own internal studies, however, have convinced them that smaller centers of thirteen or less were more effective. Moreover, through englightened self-interest, most organizations had abandoned super-rationalizing (divide and de-skill) as an approach to word processing. However, in most organizations, wp jobs have simply evolved without explicit design.

The evidence tends, if anything, to indicate that wp jobs require more experience than the workforce can provide. Overall, 44% of respondents indicated availability of qualified wp operators was "poor"; 19% "ok" and 37%

"good." Because of the job requirements, 52% of respondents indicated that new hires had to have prior experience (although there was no significant association with perceived availability). Of respondents who knew (N = 68), 60% indicated that temporary help were used. Supervisors tended to hire temps while searching for experienced wp operators for permanent hire. The types of organizations more likely to report poor availability were the very largest companies, and insurance (54% reported "poor" availability), government (64%) and communication technology (60%) organizations. Consolidating categories into "poor" and "otherwise," and considering only public and private-for-profit organizations, the former type tended to have more difficulty (59%) than the latter (41%) in finding qualified personnel (d.f. = 1, chi-square = 2.9, p .09). Good training is especially needed when qualified wp people are difficult to find; "poor" training (8%), as opposed to "ok" (16%) or "good" training, associated with "poor" as opposed to "otherwise" availability (d.f. = 2, chi-square = 5.3, p .08). One conclusion of a nationwide survey of 500 companies by Kelly Services mirrors our results: "The supply of fully qualified employees will continue to lag behind demand, frustrating employers who attempt to staff automated offices solely by recruiting" (results reported in Hubbartt, 1983).

Low pay scales are particularly a problem in Washington, D.C. where law offices often pay twice as much as government agencies, which typically classify operators as GS-2 to GS-4. The response of agencies to the problem of retaining competent wp operators varies. One organization was hiring GS-1s—part-time high school students. They were also using ten-year-old equipment while new equipment, delivered a year before, sat untouched. The supervisor feared her staff would be unable to learn the new equipment; operators told us that they were eagerly awaiting training because once trained, they would have marketable skills to go elsewhere.

In contrast, another agency is acquiring word processors for use by professionals. The consensus there is that most of the functions of clerical support can be replaced with electronics. An agency lawyer, for example, said that a support person would be useful to run errands, but that he and his professional staff (GS-10 and above) were handling all the information and document tasks done by clerics in other organizations. Indeed we found his uses among the most adaptive and he could cite savings of several million dollars that might have been spent foolishly had he not developed information uses for wp machines.

The most frequent way government agencies get around policy restrictions is to use secretaries to do wp work on a part time basis. Secretaries, according to long-standing government personnel policies, are paid on a higher scale. The District Director of an agency that performs audit functions feared that personnel regulations on the wp grade levels would not allow him to promote GS-4s to GS-7s so that they could assist in audit work; without the change the work would be done by GS-12s. One result is that word processors are used

like pencil sharpeners: equipment to be shared, but with little training or management. Equipment is often underutilized. No one encourages communication about system use; no one provides rewards for adaptations; no one standardizes codes, protocols, or priorities. This use of wp has been consistently criticized by investigations by the General Accounting Office (1979, 1982).

Indeed, in a criticism of office systems use in general, one GAO report concludes from a review of 46 systems: "Even though the five systems studied (in-depth) were selected primarily because of evidence of beneficial improvements only one was considered definitely cost-effective" (GAO, 1981:5). We have found, however, a few places where federal supervisors have been successful, after considerable documentation and time, in gaining higher pay grades for wp operators.

We see the personnel classification issue as part of a larger one of whether policy can keep up with technology. What happens when new technology creates new kinds of jobs, and indeed new organizational boundaries? In banking, for example, letters of credit used to take weeks to construct, using the contributions of employees from several departments. Now they can be done almost entirely by one person. In large private organizations where the fight to win wp classifications has been won, narrowly defined jobs are disappearing as wp becomes but one function in an integrated office system.

Figures from the Kelly survey noted above show that nearly half of the companies reported a belief that current job categories will be changed by office automation; further, 64% reported that technology changes will lead to upgrades in some categories.

Classification personnel have traditionally been a bulwark for conservatism in organizations. Wp history indicates that new roles and functions for job design and classification personnel as well as wp operators must be developed. Alternative work schedules—flextime, part-time, job sharing—may be particularly suitable for information-based positions such as word processing (except in organizations where machine use is tightly scheduled). In a 1978 national study, half of the 31 organizations with less than one year's experience with flextime reported improved recruitment ability; 62% of the 61 organizations with more than 3 years' experience reported improvement (Burr, 1980).

COMPATIBILITY/STANDARDIZATION

We expected to find most organizations reporting serious problems with compatibility. In fact, only 23% reported significant problems. 15% said they had some problems, but it was not a major issue. 63% reported no problems. These summary figures mask the trend line. Some organizations initially bought stand-alones from different vendors. The multivendor environment of stand-alones produced management problems such as diskettes not being interchangeable. Within three years, however, most organizations had converted to a single vendor so that compatibility of stand-alones was no longer a problem.

As installations became more sophisticated in their wp use, they began to expand into an integrated environment. For example, respondents at forty sites specifically mentioned recent addition of telecommunication services. 33% now regularly telecommunicate; another 12% do so occasionally. Phototypesetting (done by 23% of sites), communicating with mainframes (7%), and optical scanning (13%) all require compatibility not among wp equipment by different vendors, but among different kinds of equipment. This raises the standardization issue to a different level.

The problem, thus, can be seen as one of consumer protection rather than standardization *per se*. The compatibility issues are complex, however, and many consumers are likely to remain naive, and thus commercially vulnerable, for quite some time. The multi-vendor environment is populated at this time with a few companies with early and large market shares, with additional services and capabilities provided by associated vendors. We see a growing trend toward reliance on a few vendors. The only recourse consumers have is to procure the most popular brands, hoping that other media will be compatible. Unfortunately, even single-vendor media are not necessarily compatible. Higher-level equipment may not be compatible with earlier models. The tendency toward what we call *associated vendor oligopoly* and the attendant inefficiencies in expansion cannot be regulated away. The regulatory issues in standardization are too complex, technologically and politically. However, consumers need protection, but not only from the identified vendor of a particular machine.

The integrated systems environment produces a new situation; one almost without precedent in consumer history. Which vendor is responsible for potential or actual interconnectivity solutions?

We see two policy directions here. One would be legislation that makes the last vendor responsible for compatibility with existing systems. Guarantees of compatibility should be enforceable without requiring demonstration of fraudulent intent. Second, a clearing house for solutions to integration problems should be established for people who seek to tie together systems already in place. The conception that led to the National Productivity Center might be a model for such a clearing house. Particularly considering that, in our sample, it was government agencies that expressed the most frustration in finding solutions to integration problems.

REFERENCES

Burr, P. (1980). Women: the Emerging Labor Force. *In* C. Sheppard, and D. Carroll (Eds.), "Working in the Twenty-First Century," pp. 98–105, NY: Wiley.

Downing, H. (1980). Word Processors and the Oppression of Women. *In* T. Forester (Ed.), "The Microelectronics Revolution," pp. 275–287, Cambridge, Mass: MIT Press.

Glenn, E. and R. Feldberg. (1977). Degraded and Deskilled: The Proletarianization of Clerical Work. *American Journal of Sociology*, 25, 52–64.

Government Accounting Office (GAO). (1979). "Federal Productivity Suffers Because Word Processing Is Not Well Managed." Government Accounting Office/FGMSD-79-17. Gaithersburg, MD: Document Handling and Information Services Facility, P.O. Box 6015 (April).

Government Accounting Office (GAO). (1981). "Office Automation in the Federal Government: A Special Report." National Archives and Record Service

Government Accounting Office. (GAO). 1982). "Strong Central Management of Office Automation Will boost Productivity." Government Accounting Office/AFMD-82-54 (September).

Hubbart, W. (1983). A Personnel Policies Primer. *Office Administration and Automation 44*, 1, 40ff.

International Data Corporation. (1980). Business Communication: Alternatives for the Eighties. *Fortune*, (February 25) pp. 25–46.

Johnson, B., Rice, R. and Taylor, J. (1983). Growing Office Systems from Word Processing. Presented to the Office Systems Research Association, Philadelphia, (February). In OSRA Conference Proceedings, 137–146. Also presented to the International Communication Association, Dallas, May, 1983.

Johnson, B., Taylor, J., Smith, D. and Cline, T. (1982). "Innovation in Word Processing: Report of a Maturing Technology. Report to the National Science Foundation, ISI 811079. Stanford, CA: Institute for Communication Research.

National Bureau of Standards (NBS). (1980). "Guidance on Requirements Analysis for Office Automation Systems." National Bureau of Standards Special Publication 500-72. LC# 80-600179. Washington, D.C.: GPO.

Peters, T. and Waterman, R. (1982). "In Search of Excellence: Lessons from America's Best-Run Companies." New York: Harper and Row.

Rice, R. (1980). Impacts of Organizational and Interpersonal Computer-Mediated Communications. *In* M. Williams (Ed.) "Annual Review of Information Science and Technology," Vol. 15, pp. 221–249. White Plains, NY: Knowledge Industry Publications.

Rice, R. and Rogers, E. (1980). Re-invention in the Innovation Process: The Case of Dial-A-Ride. *Knowledge: Creation, Diffusion, Utilization* 1, 4, 499–514.