

Using Microcomputers To Improve Decision-making  
In Third World Governments

by

Janice Zarro Brodman

The governments of developing countries generally operate under severe constraints associated with underdeveloped information systems and limited human skills in information analysis. Microcomputers have been hailed in the West as an effective tool for improving decision-making practices. To what extent can microcomputers help to improve decision-making in a third world environment?

This paper examines that question in the context of two cases of microcomputer adoption. It considers management factors that are critical to establishing effective use of microcomputers to improve decision-making. The cases then demonstrate the way in which the management factors operate to determine the impact of microcomputer use on decision-making.

The first case to be presented is the Ministry of Finance and Planning (MFP), Kenya. MFP adopted five microcomputers in the spring of 1983. The ministry had 25 microcomputers by mid-1985, and was expecting an additional 13 machines. The second case is the Ministry of Finance (MOF), Indonesia. MOF adopted a few microcomputers before 1984, but they had limited use and negligible impact. In the summer of 1984, the ministry adopted 200 microcomputers as part of a major effort to reform certain ministry processes.

The conclusions offered here are tentative, based as they are on the relatively short period of microcomputer use in the cases. Nonetheless, these two ministries are on the cutting edge of microcomputer use in the governments of developing countries. Their experiences therefore provide valuable insights into the potential benefits of and obstacles to effective microcomputer use.

### THE IMPORTANCE OF MANAGEMENT FACTORS

The rate of microcomputer adoption by the governments of less developed countries (LDCs) is increasing rapidly. A central goal of microcomputer use is to improve access to information, thereby producing more informed, better reasoned decisions. For virtually all such microcomputer adoption efforts, attention is focused almost exclusively on technical issues, i.e., hardware and software choices, and training in microcomputer operations.

Yet the evidence from several cases of microcomputer adoption in LDCs, two of which are presented here, suggests that the major obstacles to achieving optimal microcomputer use lie not with technical issues, but with management conditions.<sup>1</sup> These observations are supported by studies of microcomputer adoption in the West. They also conform to findings in the wider literature on organizational change through adoption of new technologies.<sup>2</sup>

Four management factors emerge as critical determinants of the extent to which microcomputer use improves the quality of decision-making. The first factor concerns leadership messages.

Highly visible leadership support has been cited in the literature as critical to the adoption of innovation in an organization.<sup>3</sup> Explicit leadership support is important not only to ensure requisite resources, but also to legitimize the innovation, to build a common vision of change, and to convince people that the change is real.

The cases demonstrate the importance of clear, consistent, positive leadership messages in order for microcomputer use to contribute to improved decision-making in the organization. These messages include not only explicit statements but also implicit signals. For example, the level of staff that senior officers assign to microcomputer operations sends implicit signals about senior officers' perceptions of microcomputer use. If only clerical staff are assigned, the professional staff are likely to infer that senior people consider microcomputer operations inappropriate for professionals.

The second factor involves requisite training. The case study evidence indicates that training in the use of the information provided by the microcomputers is as important as training in the operation of the microcomputers. If microcomputers only provide the same information as was produced manually, training in the use of the information may not be necessary. Microcomputers are often used to produce information that was not available previously, however. Where that is the case, training information-users in the analysis of the information is likely to be essential.

The third factor concerns the incentive system. Many studies of microcomputer adoption in the West are now concerned with the influence of "orgware" (human and organizational factors). One of the most important "orgware" factors is the incentive-sanction system. The case studies make it clear that the incentive/sanction system must support microcomputer use if people are to invest their time in learning to use the microcomputers and the information microcomputers make available.

Incentives can be tangible or intangible. Microcomputers themselves provide certain incentives inherent to their use. Microcomputers make many tasks easier and more interesting, for example.<sup>4</sup> Incentives external to the organization can also encourage people to learn to use microcomputers and to develop analytic skills. If, for example, microcomputer skills are perceived to expand employment opportunities outside the organization, that perception can be a powerful incentive for learning to operate microcomputers.<sup>5</sup>

The fourth factor is the power structure. The case studies make it evident that the power structure strongly influences the extent to which information provided by microcomputers actually influences decision-making. In most cases of microcomputer adoption, there is likely to be some conflict among decision-makers about the value of microcomputers. Although acceptance of microcomputers need not be unanimous among decision-makers, those with power over resources critical to effective microcomputer use must support adoption. Otherwise, there are likely to be serious

obstacles to using microcomputers to improve decision-making.

These four factors become particularly important when microcomputers are adopted to bring about certain types of change. Although projects often have more than one objective, for the sake of clarity we can distinguish between two types of goals. One involves a "technical" solution, i.e., the goal is only to achieve greater accuracy and faster processing of the same information that is already being used. The second involves a "comprehensive" solution, i.e., the objective is to induce new ways of using information, or use of new kinds of information.

If only a "technical" solution is sought, there is a high probability that microcomputer adoption can make a significant contribution. The major components of success will be introduction of the microcomputers and appropriate software, and training staff in microcomputer operations -- relatively straightforward tasks. If, however, a "comprehensive" solution is needed, merely introducing microcomputers and software and training staff to operate them will not be enough. Successfully bringing about changes in the way information is used will depend largely on the attention paid to the four management factors cited above.

The following discussion examines the four management factors in the context of some specific applications. Although identification of the factors emerged from examination of many applications within three ministries, space constraints prohibit discussion of all of the applications. Instead, two applications

will be presented to illustrate the ways in which key determining factors operated. A more detailed presentation and analysis of all of the major applications in the three ministries are in Brodman (1985).

## EXAMINATION OF THE FACTORS IN THE CONTEXT OF THE CASES

### The Ministry of Finance and Planning, Kenya

Microcomputers were introduced into the Ministry of Finance and Planning by the Rural Planning Project (RPP).<sup>6</sup> Advisors associated with RPP are charged with assisting MFP to strengthen staff skills and institutions for rural development planning and implementation. RPP advisors have introduced 25 microcomputers to help improve the ministry's financial systems and planning capacity. One of the most important microcomputer applications is in budget production.

#### Budget Production

Microcomputers went on trial in April 1985, as a tool to produce the budget. MFP officers had two kinds of objectives in using microcomputers for budget production. One expectation was simply to improve the speed and accuracy of calculations, and eliminate many of the routine proof-reading and retyping tasks. In previous years, budget production was a period of frenzied, almost chaotic activity. Yet the budget was inevitably delivered at least two weeks late to Parliament. Budget officers hoped microcomputers would help them to deliver the budget on time.

A second objective was to improve the substance of budget allocations by changing the way financial information was used in decision-making. Customarily, budget officers arbitrarily cut line ministry budget submissions, giving the ministries only a brief opportunity to look over the result before the budget was printed. As a result, allocations were not optimal, and the cuts sometimes impaired important projects or the line ministry's basic operations. RPP advisors and the top echelon within MFP expected that use of the microcomputers would enable budget officers to spend more time analyzing the submissions from, and interacting with the line ministries.

The first goal of using microcomputers in the budget production process of 1985 was clearly achieved. MFP completed the budget two weeks before the deadline -- a notable success. Although officers certainly worked hard, they did not have to work late into the night, as they had previously. The achievement was all the more significant because the deadline had been pushed forward two weeks.

Yet not all finance and budget offices were enthusiastic about the use of the microcomputers. There was strong resistance to the microcomputer system from many budget officers, who were reluctant to change the way they had prepared the budget in the past. To some extent, budget officers' criticism of the microcomputers justifiably pointed out the frequency with which errors went uncorrected during the budget production process. Those problems were rectified by improving supervision of quality control.

Far more important, however, were issues of power and incentives. To many budget officers, the microcomputer system presented a threat to their authority. Previously, the budget officers had a great deal of autonomy in the budget process. They dealt only with subordinates, clerks and secretaries, and were clearly in charge of the process. When the microcomputers were introduced into the budget process, several new professionals also became involved in the process. Not only did these professionals understand the microcomputers far better than did the budget officers, they also sharply criticised the fundamental budget production process. The budget officers responded to those criticisms with strong resistance to the entire microcomputer system.

In addition, leadership messages and the incentive system deterred budget officers from supporting use of microcomputers in the budget production process. During the first year of microcomputer use, many leadership messages discouraged use of microcomputers. The staff of the government computer center (CBS), which is within MFP, were highly critical of microcomputer adoption. There was general underlying skepticism among some senior MFP officers about the effectiveness and appropriateness for Kenya of the "high Western technology" embodied in microcomputers.

Those messages changed greatly in 1985. Top ministry officials became visibly committed to using microcomputers to produce the budget. Yet ministry leadership virtually ignored the budget officers' role in computerizing the budget production process.

Ministry leaders were convinced that budget officers would inevitably be recalcitrant, and it would be impossible to enlist their support for the change. They therefore excluded budget officers from the new system insofar as possible.

The budget officers responded to these implicit and explicit messages from ministry leadership by questioning the value of learning to use the microcomputers. They also wondered how long the microcomputers would remain in the ministry after the advisors went home. Furthermore, they felt threatened by being excluded from establishment of the microcomputer system. For them, the message was that microcomputers would ease their responsibilities for production but would simultaneously usurp their authority.

These conditions also strongly impeded attainment of the second goal, improving the substance of budget allocation decisions. Completion of the budget two weeks before the deadline gave ministry officers considerably more time to review and consider substantive finance issues reflected in the budget. They did, in fact, analyze budget entries to limited extent, e.g., checking to ensure that line ministry submissions were within their ceilings. The financial analysis that occurred, however, consisted primarily of "mechanical" tasks. It was conducted in an ad hoc manner rather than systematically.

Little if any substantive analysis was conducted. Nor did budget officers spend more time conferring with the line ministries. Decisions were made more quickly, but were not substantively

different from the decisions that would have been made without the use of the microcomputer system.

Inadequate training accounted for part of the resistance. Many budget officers have not had training in the financial analysis skills. Nor is there any ministerial program to provide that kind of training. In addition, budget officers were expected to use entirely new management skills. Yet they were given no explanation of the new management approach expected of them. They required training in the kind of participative management style that the leadership wanted them to adopt.

Budget officers also needed some incentive for changing (or sanctions for not doing so). Instead, the incentives encouraged them to resist the new system, which threatened their power. The situation also discouraged any impulse budget officers might have had to increase the involvement of the line ministries in budget allocation decisions, since that would further erode their authority. Thus, budget officers responded the way most managers react when their power appears under attack: they dug in and protected their authority from any further encroachment.

While top ministry officials could use their own power to enforce new processes, inducing budget officers to develop new management techniques requires a different sort of influence. Like upper-middle managers in most large organizations, the budget officers of MFP have considerable power to obstruct change. It is therefore likely that successful reform in decision-making practises will come about through the enlistment of the budget

officers' commitment through leadership messages and incentives, rather than by attempts to impose change on reluctant officers.

#### The Ministry of Finance, Indonesia

The introduction of microcomputers into MOF, Indonesia, contrasted sharply in several ways with microcomputer adoption in MFP, Kenya. First, the initiative to adopt microcomputers was made by the head of MOF's computer center (PAIK), rather than at the suggestion of advisors. Second, MOF adopted 200 microcomputers, a much larger number than did the Kenya ministry. Third, MOF placed the microcomputers in district offices rather than only in headquarters. Fourth, although one goal of adoption was to improve the accuracy and speed of information processing, another explicit goal was to alter the distribution of decision-making power between headquarters and the district level of the Tax and the Customs Directorates.

The goals of adoption and the pattern of introduction and use are very similar in both the Tax and the Customs Directorates in MFP. This discussion focuses on the Tax Directorate because microcomputers have been introduced much more widely there -- they are in 69 district tax offices and only one district customs office. The establishment of microcomputer systems has also proceeded more quickly in the Tax than in the Customs Directorate. It is important to note, however, that the key factors discussed below have been equally relevant in the Customs Directorate.

## Improving Files and Reducing Irregularities at the District Level

One important objective in introducing microcomputers was to maintain more accurate and efficient files on taxpayers. The microcomputers are also part of a new system of tax reporting that is designed to reduce irregularities in tax collection and reporting at the district level. PAIK expects that the microcomputers may eventually pay for themselves by helping to reduce corruption at the district level of the Tax Directorate.

Under the previous system, district office tax collectors went into the field to assess and collect taxes. The tax payments were recorded at the district tax office, which retained the details of taxpayer information. Taxpayers were audited at the district level, and the local tax office reconciled taxes due and taxes paid. Aggregate statistics were sent to the provincial level, along with the taxes that had been collected. The level of aggregation of tax information forwarded to the provincial office varied among the districts. There was rarely greater detail, however, than the final amount paid by individuals; some districts sent only the total amount collected for towns, or villages, or even for the district as a whole.

Under the new system, there is no contact between district tax officers and taxpayers. The taxpayer sends his/her tax form and payment to the district office. A district officer immediately enters the information from the tax form into a microcomputer. The data are then entered a second time by another operator and the two records are automatically checked for consistency by the

7  
microcomputer. The microcomputer produces a letter to the taxpayer informing him/her of the tax number assigned. The microcomputer also produces a card with the taxpayer's address, which is kept at the district.

All data flow from the district to the regional level. Each week, the districts make a streaming tape of the taxpayer information collected during the week. They send the tapes by mail to the regional office. At the regional office, the information is entered into a minicomputer to produce a cumulative file. The regional office then sends the data to Jakarta to be entered into the mainframe computer.

At the district level, microcomputers are to be used only to prepare information to be sent to the regional office, and to maintain files on tax information. At the regional offices and at headquarters, the computer system is to be used to keep records, monitor tax collection, automatically check tax returns using auditing routines, analyze trends in individual and district tax payments, and produce reports.

The district offices are being made aware of the several cross-checks that are performed on the tax information at the regional and central offices. If the regional office does not receive an individual's tax report shortly after the date of filing, inquiries are made at the district office. If there are questions about tax records, or an audit must be conducted, the region directs the district office to conduct the audit and file a report. The corrected information is then sent to the region,

where the cumulative file is updated. The regional office also follows up to ensure that tax payments are corrected.

Although it is too early to evaluate the system generally, it appears that there has been considerable progress toward headquarters' goals. Tax information appears to be more accurate and readily available. Although there were early difficulties with uncorrected data errors, they have been curbed through additional training and experience at the district level. The greatest technical problem relates to transferring information from district to regional offices. Using streaming tapes is more secure than the original plan to use computer discs. Yet issues of information security continue to demand attention.

Initial experience with the system also suggests that PAIK's expectation that the microcomputers will pay for themselves by limiting corruption is not unrealistic. In many districts, tax revenues increased after the microcomputer system was installed. In some districts revenues doubled.

The four key management factors have played a central role in this experience. There has been strong, explicit support for microcomputer adoption from top political leadership as well as from leaders within MOF. These messages have contributed to the relatively rapid, widespread acceptance of microcomputers in MOF. Although there will be negotiation over such issues as how the microcomputers are used and who has control over them, there is little if any doubt on the part of staff throughout the ministry

that microcomputers will be a permanent part of the ministry operations.

Training in microcomputer operations has been relatively simple since PAIK staff designed easily understood, menu-driven programs, in Indonesian, that are used in the districts. PAIK staff, along with staff from IBM (from whom they bought the microcomputers), introduced district staff to the machines with easy first steps, including computer games. As people become more comfortable using the microcomputers, they are introduced to the programs related to their work.

In this early stage of introduction, PAIK made the conscious decision to use the district microcomputers only to replicate the output that is being produced (or is supposed to have been produced) manually. Aside from maintenance of taxpayer files and preparation of reports to be submitted to the regional office, the district office microcomputers are used only for limited administrative work. Consequently, training in the use of the information provided by the microcomputers has not yet become necessary. In fact, the district offices using the microcomputers are now conducting less information processing than in the past, since they must merely forward taxpayer information to the regional office rather than use the information to assess taxes.

A more difficult training problem relates to developing the skills required for designing the information system. A major challenge is bridging the gap between "substantive" knowledge about tax information and "technical" knowledge about the

principles of microcomputer operations. To better link the "technical" with the "substantive," MOF established teams of tax officers and PAIK officers. Through collaborative work, tax officers have gained better understanding of the principles of microcomputer operations and PAIK staff developed better comprehension of tax issues. Yet PAIK staff sometimes makes decisions that do not accurately reflect the substantive information needs. Tax staff tend to want to simply transfer all information from paper to microcomputers, in ways that do not exploit the advantages of microcomputers. Continued cooperation between the two groups of professionals will be necessary to make headway in resolving the problem.

MOF also has plans to use microcomputers for financial analysis. PAIK expects to establish a systematic program to train regional and headquarters staff to conduct such analysis. Although the viability of such training programs cannot, of course, be predicted, PAIK's recognition of the need for such training is worthy of note.

PAIK has also explicitly addressed the need for incentives to induce staff to learn to use the microcomputers. They anticipate future financial compensation for ministry staff who learn to operate the microcomputers. Meanwhile, the incentives include training in microcomputer skills. MOF staff perceive the training to be valuable both because of leadership messages and because they believe such training improves employment opportunities in the private sector.

The most significant difficulty in establishing microcomputer use relates to the power structure. Although some district offices have responded positively, top staff of many district offices are unhappy with the new system. They have told headquarters that the new system cannot work, that microcomputers cannot handle the information needs of their offices. They have complained bitterly about every mistake in microcomputer-produced reports. They have made clear their general disgruntlement with having the machines placed in their offices. They have attempted to withhold the resources over which they have some power, notably local staff cooperation in establishing the new system. Yet the power of headquarters, and the incentives for district officers to learn to use the new, high-status machines, appears to have been able to offset the influence of the district leadership.

To a significant extent, the resistance of district office leadership is not to the microcomputers per se but to the local office's loss of power to headquarters. For some, this reaction is a response to the perceived threat to opportunities for private gain. But for many it is a reaction to the loss of decision-making authority that local offices are loath to give up to headquarters, which they perceive to be often out of touch with local conditions.

There has been no attempt on the part of MOP leaders to design incentives that might win over support from district heads. Given the real losses in power that district heads are experiencing, it would be difficult to provide sufficiently strong incentives to gain their support for the system. The resolution of the conflict

is likely to depend on the relative power of headquarters and the district leadership in determining the de facto if not de jure processes by which local offices are run.

#### SUMMARY AND CONCLUSIONS

This study used two cases to examine critical factors determining the success of microcomputer use to improve decision-making. The Ministry of Finance and Planning in Kenya used microcomputers in the budget production process in order to accelerate the physical production of the budget, as well as to improve the use of financial information in the budget allocation decisions of budget officers. The Ministry of Finance, Indonesia, introduced microcomputers to improve information in the Tax and Customs Directorates, and to centralize ministry tax and customs operations in order to increase the accuracy of assessment and collection of fees.

Management systems and structures, rather than technical issues of hardware, software and computer skills, emerged as key to determining the response to microcomputer adoption in the ministries. Primary among those factors were the role of government leadership, training in the use of information in decision-making, the ministry incentive system, and the power structure.

Leadership messages were important in convincing staff that microcomputer use was supported by the leadership, and that microcomputers were to be a permanent part of ministry

operations. Where those messages did not clearly encourage professional staff to learn to use the microcomputers and to utilize the information for better decision-making, professional staff resisted doing so. Where leadership messages were strong, positive, and consistent, acceptance of the use of microcomputers was established more quickly and widely.

The cases also illustrated the importance of providing training in the use of information from the microcomputers. The relative importance of such training depends on the ways microcomputers are used. There are two fundamental ways microcomputers can change the availability of information. First, they can provide the same information as was produced previously, only faster, more easily and accurately. Second, they can provide new kinds of information that hadn't been available previously, or old kinds of information presented in new ways.

These differences have implications for the kinds of training that are required. If information is to be used as it had in the past, training in microcomputer skills is likely to be sufficient. If, however, new information is to be used, or information is to be used in a new way, staff must be trained in the use of the information. If training in the use of information is not conducted, microcomputers are likely to have little impact on decision-making.

There is substantial literature that suggests the importance of incentives in inducing acceptance of organizational and technological change. The cases demonstrated some incentives that

are inherent in microcomputer use, e.g., use of microcomputers makes the work faster, easier, and/or more interesting. They also made clear the importance of the organization's incentive system in determining the impact of microcomputer use.

In MFP, the incentive system has deterred positive response to microcomputer use among budget officers. The formal system offers no positive incentive for learning to use the microcomputers or analyzing financial information, nor any sanction for not learning to do so. Furthermore, the incentives within which budget officers operate discourage them from supporting the new system which seems to be eroding their authority.

In MOF, Indonesia there is recognition of the importance of incentives to encourage use of the microcomputers. There are plans to provide material incentives to those who develop those skills. In one directorate, selected staff are receiving highly valued training, including training abroad, in various aspects of microcomputer use. These opportunities provide strong incentives for staff to learn to use the microcomputers.

In contrast, the formal and informal structure of incentives in MOF discourages acceptance of the microcomputers among the heads of some local tax and customs offices. Resistance from those offices has been considerable. Although effective use of microcomputers in the districts may eventually become established due to the power of headquarters, the process would be greatly facilitated by incentives encouraging the leadership of local

offices to accept the microcomputers as a permanent part of the system.

The experiences in Kenya and Indonesia also make it clear that microcomputers are not a apolitical tool. There are likely to be some who perceive their interests to be served by microcomputer adoption, and others whose interests are threatened by adoption. In order for microcomputer use to be effectively established, those who support such use must have control over critical resources.

In MFP, the budget officers who perceive their authority to be threatened have strongly resisted the microcomputer system. In MOP, Indonesia, district officers consider microcomputers a threat to their power and have adamantly resisted microcomputer introduction. The impact of the microcomputer system in these cases will depend in part on the relative power of these groups vis-a-vis those supporting microcomputer use.

Thus, the cases illustrate the contributions microcomputers can make in improving the availability of accurate information for decision-making. If the information is to improve the quality of decision-making, however, leadership messages, training in information use, the incentive system, and the power structure must support the change.

Yet it is also important to note that there are limits to the extent to which a government agency is willing and able to make decisions solely on a "rational" basis. There is inevitably a conflict between allocating resources efficiently, and responding

to other considerations, including political pressure and personal gain. It is a conflict that is as relevant in the more developed as in the less developed countries. Although microcomputers can attenuate the influence of these "irrational" pressures, they will not eliminate them. Nonetheless, with the proper support from management systems, microcomputers can help to significantly improve the quality of decision-making.

## FOOTNOTES

1. The study from which the cases examined here are drawn is Brodman (1985). That study analyzes several applications in three ministries, and fully develops the conclusions presented here. For other case studies in LDCs, see U.N. Centre for Science and Technology for Development (1985); "The USAID/Honduras Contraceptive Social Marketing Project" (undated: 41-42); Ourusoff (1983); Ingle and Connerley (1984); Bertoli and Bertoli (1981); Mann (mimeo); Pinckney, Cohen, and Leonard (1982); Pinckney, Cohen, and Leonard (1984).

2. There is a very large literature on innovation in organizations. Rather than try to list all relevant materials here, this note mentions some of the less well known references. Regarding the importance of leadership to technological innovation in the private sector, see Cleland (1975). Some of these factors emerged in computer adoption in U.S. local governments; see Kraemer and King (1977); Danziger, Dutton, Kling, and Kraemer (1982). For a general discussion of some of the important factors in organizational operations that also seem relevant to microcomputer use, see Bower (1983); Jackall; McFarlan and McKinney (1983); Rondinelli (1976); Johnston and Clark (1982).

3. There is a large literature, particularly about the private sector, that notes the importance of positive, visible leadership in legitimating innovation. Albricht (1973), for example, describes the importance of top management backing of a new information system through its "ups and downs." Also see Schwartz, Bennigson, and Brodman (forthcoming). A good discussion of the influence of the manager is in Leonard (1977). Also, regarding the importance of leadership, see Vertinsky and Barth (1972); Guest (1962); Walton (1975). McCaleb (1982) gives practical advice in exercising leadership to the head of a business (or any organization) introducing microcomputers. In examining technological innovation in local U.S. governments, Perry and Kraemer (1979: 101) found that leaders' support was relatively less important than other factors, e.g., the general level of professionalism in the organization. Mann (mimeo) suggests that leadership was extremely important in the adoption of microcomputers in the Ministry of Agriculture, Tunisia.

4. See, for example, Brodman (1985); Kraemer and Danziger, (1984).

5. Brodman (1985) discusses the importance and implications of incentives related to improved employment opportunities outside the adopting ministry.

6. RPP is conducted by the Harvard Institute for International Development, Harvard University. An interesting discussion of Rural Development Planning in Kenya is presented in Bethke, Cohen, and Hook (1984).

7. These are IBM personal computers that are linked to use a common data base.

8. It is also important to note that microcomputers themselves can support such training. By providing information more easily, quickly, and in more accessible formats, microcomputers can serve as effective tools in training officers to analyze information. See Brodman (1985).

## LIST OF REFERENCES

- Albrecht, L.K. (1973). Organization and Management of Information Processing Systems. New York: Macmillan Co.
- Bertoli, F. & Bertoli, S. (1981). The Utility and Potential Applications of Microcomputers in Data Processing and Analysis: A Report On Operational Support in Rabat, Morocco (AID/DSPE-C-0053). Washington, D.C.: U.S. Agency for International Development.
- Bethke, K., Cohen, J.M., & Hook, R.M. (1984, June). History of Rural Development Planning in Kenya. Mimeo.
- Bower, J.L. (1983, July-August). Managing for Efficiency, Managing for Equity. Harvard Business Review, 83-90.
- Brodman, J.Z. (1985). Microcomputer Adoption in Developing Countries: Old Management Styles and New Information Systems. A report prepared for the International Development Management Center, University of Maryland, College Park, Maryland.
- Cleland, D.I., & King, W.R. (1975). Systems Analysis and Project Management. New York: McGraw-Hill Co.
- Danziger, J.N., & Kling, R. (1982). Computers in the Policy Process. In Computers and Politics: High Technology in American Local Governments. Danziger, J.N., Dutton, W.H., Kling, R., & Kraemer, K.L. New York: Columbia University Press.
- Guest, Robert H. (1962). Organizational Change: The Effect of Successful Leadership. Homewood, Illinois: The Dorsey Press, Inc. & Richard D. Irwin, Inc.
- Ingle, M.D., & Connerley, E. (1984, January). Microcomputers and Program Management in Portugal: A Case Study of emerging Technologies in the Agricultural Sector. Paper prepared for the International Labour Organization, Division of Science and Technology, Geneva.
- Jackall, R. Moral Mazes: Bureaucracy and Managerial Work. Harvard Business Review, 118-130.
- Johnston, B.P. & Clark, W.C. (1982). Redesigning Rural Development. Baltimore, MD: Johns Hopkins University Press.
- Kraemer, K.L. & Danziger, J.N. (1984, January-February). Computers and Control in the Work Environment. Public Administration Review, 32-40.

- Kraemer, K.L. & King, J.L. (1977, February). A Critical Assessment of Urban Technology Transfer: The Case of Computing Applications in U.S. Local Governments. Paper prepared for Transfer 4. Irvine, CA: The URBIS Group, University of California, Irvine.
- Leonard, D.K. (1977). Reaching the Peasant Farmer. Chicago: University of Chicago Press.
- Mann, Charles K. Microcomputers in Agricultural Planning in Tunisia: Report of a Follow-up Visit. Mimeo.
- McCaleb, Robert B. (1982). Small Business Computer Primer. Beaverton, Oregon: dilithium Press.
- McFarlan, F.W. & McKinney J.L. (1983, July-August). The Information Archipelago - Governing the New World. Harvard Business Review, 91-99.
- Ourusoff, Nicholas. (1983, September). Planning in Malawi: The National Statistical Office and Ministry of Agriculture. Mimeo.
- Perry, J.L., & Kraemer, K.L. (1979). Technological Innovation in American Local Governments/The Case of Computing. New York: Pergamon Press.
- Pinckney, T.C., Cohen, J.M., & Leonard, D.K. (1982, August). Microcomputers and Financial Mangement in Development Ministries: Experience From Kenya. Development Discussion Paper No. 137. Cambridge, MA: Harvard Institute for International Development, Harvard University.
- \_\_\_\_\_. (1984, June). Kenya's Use of Microcomputers To Improve Budgeting and Financial Management in an Operating Ministry: An Updated Report. Development Discussion Paper No. 169. Cambridge, MA: Harvard Institute for International Development, Harvard University.
- Rondinelli, D.A. (1976, Fall). International Assistance Policy and Development Project Administration: The Impact of Imperious Rationality. International Organization, 30.
- Schwartz, H., Bennis, L., & Brodman, J.D. (forthcoming). The CEO's Change Agenda. Organizational Dynamics.
- The USAID/Honduras Contraceptive Social Marketing Project, A Critical Path Analysis - Using an Apple II & a Visi-Schedule Program. Mimeo.
- United Nations Centre for Science and Technology for Development. (1985). Microelectronics and Decentralized Development. Advanced Technology Alert System Bulletin, second issue.

Vertinsky, I., & Barth, R.T. (1972) A Model of Diffusion and Implementation: An Exploratory Study of Managerial Innovation, Columbia. Socio-Economic Planning Sciences, 6, 153-171.

Walton, R.E. (1975). The Diffusion of New Work Structures: Explaining Why Success Didn't Take. Organizational Dynamics, 3, (3), 3-22..