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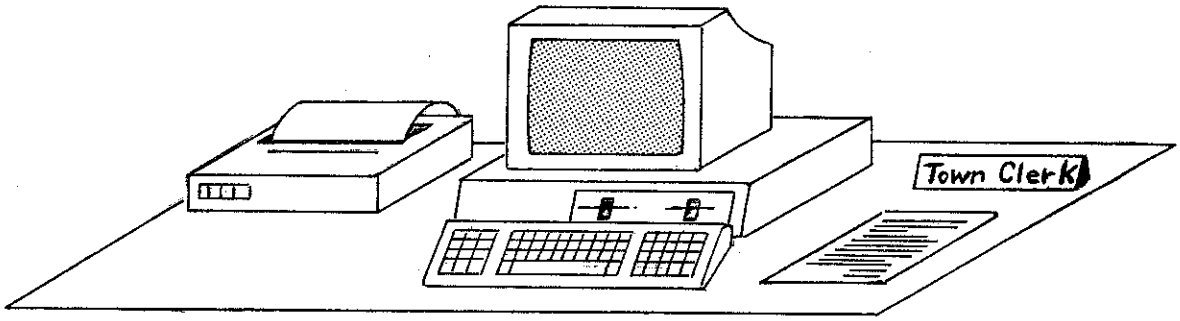
MICROCOMPUTERS AND NEW YORK TOWNS: A SUMMARY OF A SURVEY REPORT



Duane E. Wilcox

Local Government Program

Department of Agricultural Economics
New York State College of Agriculture and Life Sciences
A statutory College of the State University
Cornell University, Ithaca, New York 14853-7801

This report provides a summary of a much longer survey report on microcomputer use by New York towns undertaken by the Local Government Program of Cornell University in late 1985 and early 1986. The complete research report appears as A.E. Research 87-29, Microcomputers and New York Towns: A Survey Report. Copies may be obtained by writing to:

Duane E. Wilcox
Department of Agricultural
Economics
312 Warren Hall
Cornell University
Ithaca, New York 14853-7801

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I. INTRODUCTION: SURVEY OBJECTIVES AND PROCESS

How many towns in New York State are using microcomputers?

Are large towns making more use of microcomputers than smaller towns?

What kinds of microcomputers are towns using?

What are they using them for?

The Cornell University Local Government Program set out to answer these and related questions by means of a survey of towns in late 1985 and early 1986.

The survey grew out of a program of microcomputer workshops for local government officials and employees that the Local Government Program was conducting in cooperation with statewide local government associations. The two Cornell instructors involved in these workshops realized that very little was known about microcomputer use by local governments in New York State. More information, it seemed to them, could be useful to numerous other parties, such as local government officials and employees, staff members of statewide local government associations, and those providing education, technical assistance, and microcomputer systems to these local governments. The researchers also hoped that the survey results would help them improve their workshops and perhaps launch other projects to help local governments with the use of microcomputer technology.

A two-phase survey was used. A one-page questionnaire -- the short-form -- was sent to all towns, asking whether they used microcomputers, how many, and who owned them. It also asked for ratings of different means for helping towns acquire and use microcomputers. Those towns that replied that town officials or employees were using microcomputers for town purposes ("direct-user" towns) were sent additional forms -- one for each microcomputer -- that asked for more detailed information on their microcomputer systems, their microcomputer applications, and related matters.

The researchers wanted to analyze much of their survey data by size of town. Thus, they divided the state's 932 towns into four groups of 233 towns each (quartiles) on the basis of their 1980 populations. The towns of Quartile 1 had 1980 populations of 32 to 1,434; those of Quartile 2, 1,436 to 2,635; those of

Quartile 3, 2,639 to 6,018; and those of Quartile 4, 6,027 to 738,517.

The towns that responded to both the short-form and the long-form surveys were representative of the broader groups of towns of concern. Of the state's total of 932 towns, 705 responded to the short-form survey. Very close to 25 percent of those 705 towns were from each of the 1980 town population quartiles. The short-form data were used to estimate the total number of direct-user towns. Of the estimated total of 196 such towns, 99 responded to the long-form survey and completed questionnaires for 167 microcomputers. These 99 towns were spread across the 1980 town population quartiles in approximately the same way as the larger group of 196 towns. For example, an estimated 10 percent of the total estimated number of 196 direct-user towns were from Quartile 2, and 9 percent of the 99 towns returning long-form questionnaires represented towns of this quartile.

II. ANALYSIS OF THE SHORT-FORM RESPONSES

Microcomputer Use by Towns of Different Sizes

Even though microcomputer technology seems to be particularly appropriate for use by local governments, only 23 percent of the towns responding to the short-form survey were using microcomputers. Two important inhibiting factors at the time of the survey might have been the fairly brief length of the "microcomputer revolution" and the lack of numerous software products created specifically for New York State local governments. Lack of understanding of computer technology on the part of many town officials and employees and tight finances for many towns may also have been significant barriers to the use of this new technology. Finally, many interested town officials probably wanted to hear about successful use of microcomputers by other jurisdictions before making a commitment to their use.

Use of microcomputers generally increased as size of town increased. The percentage of responding towns using microcomputers was approximately 11 for each of the first two quartiles. But for the towns of Quartile 3, it increased to 22 percent, and for those of Quartile 4 it increased to 47 percent. Since almost all of the towns of Quartiles 1 and 2 and even many of Quartile 3 should be regarded as rural towns, an important implication of these percentages is that rural towns are lagging behind the non-rural towns in the adoption of microcomputer technology.

What factors might be contributing to this lag? If properly selected, acquired, and used, microcomputer systems probably constitute cost-effective technology for the great majority of

New York State's rural local governments. But the incentives to adopt the technology are greater for larger, non-rural towns because they have greater needs to organize, update, and manipulate substantial amounts of data -- for example, bookkeeping data and water and sewer bills and records. Second, the purchase of a microcomputer system is a less significant expenditure in the budgets of larger towns than in those of rural towns, making it easier to decide to purchase these systems. Third, there may be a significantly more limited understanding of this new technology in rural areas because of less day-by-day exposure to it for town officials and employees and fewer formal educational opportunities for them to learn about it.

Microcomputer Ownership by Towns Versus Other-Use Arrangements

Most of the microcomputers reported by the short-form respondents were owned by the towns themselves, but "other-use arrangements" became more important as town size decreased. Of the 163 towns reporting use of microcomputers, 124 (76 percent) reported that they owned microcomputers, 41 (25 percent) reported other-use arrangements, and 2 (1 percent) had both arrangements. For the responding towns of Quartile 1, 4 percent reported town ownership and 8 percent reported other-use arrangements. The corresponding percentages for the towns of the other three quartiles were as follows: 6 percent and 5 percent for the towns of Quartile 2, 16 percent and 6 percent for the towns of Quartile 3, and 43 percent and 4 percent for those of Quartile 4.

A town official or employee using her or his microcomputer for town purposes accounted for most of the other-use arrangements reported, both overall and in each of the 1980 town population quartiles. The next most frequently reported arrangement -- about half as many times -- was use of a private service bureau using microcomputers. One experimental cooperative ownership arrangement, involving six towns and one village and substantial technical assistance from a state agency, was being disbanded at the time of the survey. Most of the members were making other microcomputer use arrangements.

Why were numerous towns involved in these other-use arrangements rather than town ownership? A common reason was probably that use of a machine owned by an official or employee was an "add-on" to its use primarily for private purposes. Generally, the service-bureau arrangement probably involved attempts to gain access to microcomputer technology for very clearly defined and limited financial management purposes, such as bookkeeping, at a cost that town decision-makers considered significantly more affordable than that of microcomputer ownership. Additional factors leading to the use of a service bureau might have been the desire to gain such access without the perceived risks of costly and embarrassing mistakes on the part

of a particular person or the town itself and an official or employee's lack of time to learn to use a microcomputer.

In most cases, these other-use arrangements will probably prove to be transitional to town ownership of one or more microcomputer systems. For most of the towns involved in them, they should demonstrate the advantages of the technology, increase the demand for its use, and emphasize the comparative advantages of using an "in-house" town microcomputer as apposed to using one not in town offices or only partially available for town purposes.

Town Preferences for Educational and Technical Assistance

Of the six specific means for helping towns acquire and use microcomputers that the short-form respondents were asked to rate, the first preference was introductory microcomputer training sessions. This almost certainly reflects an inadequate understanding of microcomputer technology on the part of the officials and employees of most towns and their desires to overcome this limitation. A second important factor that it may reflect is a lack of introductory sessions that meet the requirements of most towns, such as low fees, training sites that do not require overnight trips for participants, and time commitments of no more than two days.

The ratings for three other methods of helping towns acquire and use microcomputers were significantly lower than the rating given introductory microcomputer training sessions, but still high enough to merit their pursuit by educational and technical assistance agencies. In order of preference, these methods were the following:

- Contact list of New York State local governments using particular hardware and software for particular applications;
- Written instructions for using software programs to accomplish common applications (such as Lotus 1-2-3 for developing an annual budget); and
- Self-study materials on initial acquisition and use of microcomputers.

The two approaches that received quite low ratings were microcomputer consulting and microcomputer fairs (vendor shows).

III. ANALYSIS OF THE LONG-FORM RESPONSES

The Momentum of Town Adoption of Microcomputer Technology

Is there evidence of year-by-year increases in the pace of adoption of microcomputer technology by towns? The long-form data on year of acquisition of town-owned microcomputers and year of first use for town purposes of other microcomputers indicated that there was such a building of momentum from 1981 through 1985 for responding towns as a group. This overall pattern was, however, entirely the result of substantial increases in the pace of adoption of the technology by the towns of Quartile 4 and much less impressive increases by those of Quartile 3. Thus, not only was the proportion of towns using microcomputers in Quartiles 1 and 2 much lower than for Quartiles 3 and 4, but there was no convincing evidence of an increasing pace of adoption of the technology by these smaller towns.

This situation suggests a number of important points. First, it seems to indicate a need for studies of the cost-effectiveness of microcomputers for smaller towns. Second, if these studies indicate that it is an appropriate technology for these towns, as seems likely, then those providing educational and technical assistance to them should place a heavy emphasis on an understanding of its usefulness and how to acquire and use it. Third, this emphasis should precede or at least accompany the implementation of technical assistance programs for these smaller towns that require that they be able to use their own microcomputers to connect to a telecommunications network or central data file. Fourth, software firms attempting to serve New York State towns should carefully examine whether they need to change existing products and marketing methods to meet the needs of smaller towns.

Microcomputer Equipment Reported by Towns

A question frequently of interest to town officials and employees is "What brands of microcomputers are towns using?" The long-form data indicated that IBM was the only manufacturer that had achieved a impressive share of the town market. Forty-three percent of the 99 responding towns had IBM microcomputers, and 41 percent of the 167 microcomputers for which long-form questionnaires were returned were IBM machines.

A related matter of significance was to what extent the microcomputers used by towns represented one or more groups of "highly compatible" microcomputers. The IBM PC microcomputers (the PC, the XT, and the AT models) and highly compatible machines from other manufacturers constituted not only a large compatibility group, but also the only significant group of this nature among the towns responding to the long-form survey. Two-

thirds of the responding towns (65 of 99) were using 103 IBM PC and highly compatible microcomputers. This represented approximately the same proportion (62 percent) of the 167 microcomputers of the long-form survey.

These data have three practical implications. First, they indicate that only the IBM PC compatibility group provides a widespread potential for town microcomputer users to help one another through the exchange of information and experiences. If a town is interested in acquiring a microcomputer that provides this potential, then it should definitely consider machines in this group. Second, providers of technical assistance and education to towns concerning use of microcomputer technology should find it possible to help many more towns and to provide more in-depth assistance if they concentrate the great bulk of their resources on the IBM PC compatibility group. Third, a continued orientation towards this group by firms developing software specifically for New York State local governments seems appropriate.

In April 1987 IBM introduced a new line of microcomputers (the Personal System/2) that adds new complexity to a town's choice of a microcomputer system. But these new machines will run software created for the IBM PC compatibility group, making them part of that group. Also, it seems clear that improved "clones" of the IBM PC machines and the software created for this group will continue to be marketed for a number of years. Thus, towns interested in purchasing microcomputer systems from the "expanded" IBM PC compatibility group will have to decide whether these new machines and any clones that are developed are better choices than the current models of the earlier members of the group.

Large proportions of the microcomputers reported by the long-form respondents were not equipped for efficient and intensive use and for communicating with other computers. Only half of the 167 microcomputers of the long-form survey were equipped with hard disks, and only 17 percent were equipped with modems.

Microcomputer Software Reported by Towns

The great bulk of the software products reported by the long-form respondents consisted of commercial packages (those sold to many users) rather than custom products (those created for use by only one town). This was also true of the responding towns of each of the quartiles.

These data indicate that towns were tending to make prudent software decisions. Paying for the development of a particular microcomputer software product for the buyer's exclusive use is almost always many times more expensive than the cost of a

commercial package for the same applications. Also, the commercial packages are generally of higher quality because they are likely to have been more thoroughly tested and because the greater economic rewards available to those creating successful commercial packages attract the best programming talent.

In terms of number of times reported, the commercial software packages formed two distinct groups. Those commercial packages that were reported by numerous towns for numerous microcomputers were word processing, spreadsheet, financial management, and database management packages. The group of commercial packages reported by many fewer towns for many fewer microcomputers consisted of graphics, communications, statistics, and all other packages. This overall pattern of two groups was also true for the towns of each of the quartiles.

The most obvious and attractive interpretation of this pattern is simply that the commercial software packages reported most often by the long-form respondents represent those most useful to towns. If this is correct, then they should be candidates for serious consideration by towns interested in an initial microcomputer purchase and in profiting from the experiences of towns already using microcomputers. Similarly, they should be seriously considered for purchase by towns already using microcomputers that lack one or more of these types of packages.

In terms of particular commercial software products (for example, Wordstar, a word processing package), the long-form respondents reported a broad array of products -- nearly 200 -- with very little "market share" won by any of them. Only 6 products were reported as available for use on ten or more microcomputers and even these 6 packages were not widely available. For example, 21 different spreadsheet packages were reported. Only 2 were reported for 10 or more microcomputers. The most frequently reported spreadsheet was Lotus 1-2-3 -- by 23 towns for 26 microcomputers.

This lack of market dominance by particular software products has both positive and negative implications for town microcomputer users and those providing microcomputer education and technical assistance to them. First, it may mean that there are many commercial software products that serve town purposes satisfactorily, lessening the chances that a town will "get stuck" with an unsatisfactory product. Second, the apparent lack of one or a few clear leaders in the sale of financial management programs developed specifically for New York State local governments may promote competition that gives towns more for their money. On the other hand, the small market shares of particular commercial packages reduces the potential for towns to provide microcomputer support to one another. This potential is severely limited when only a few users, who may be difficult to

identify and scattered over a wide expanse of territory, have the same software products. Similarly, providers of educational and technical assistance to town microcomputer users would be able to accomplish much more with their restricted resources if they were able to concentrate them on only a few dominant software products.

At least two strategies could be pursued to offset, at least in part, these two disadvantages. One would be for an organization or a combination of organizations that towns look to for assistance to recommend specific software products within categories of software that towns commonly purchase -- for example, the category of electronic spreadsheets. Care would have to be taken to insure that recommendations were not developed that might lessen desirable competition or otherwise have a net negative effect on town interests.

A second and complementary strategy would be for a technical assistance organization to develop and strongly promote materials for the use of a particular word processing package and particular applications development packages. An example is the diskette and user's manual for use with Lotus 1-2-3 for preparing a town budget that was developed by the Cornell Local Government Program. The creation and successful marketing at reasonable prices of a significant number of such materials for use with a particular software product could lead to substantially larger numbers of towns using that product.

Town Microcomputer Applications

A major part of the long-form questionnaire asked respondents to identify from a lengthy checklist the applications for which their towns were using microcomputers and to describe their other applications -- if any -- on numerous blank lines. The responses were grouped into eighteen areas of applications relating to particular local government service areas and functions.

Both for responding towns as a whole and for the towns of each of the 1980 town population quartiles, only central-staff financial management applications and central-staff word processing applications were frequently reported. Central-staff applications were defined as those generally undertaken by elected or appointed central staff that involve town operations as a whole or that are commonly done by such persons on behalf of a number of particular town service and functional areas. For example, the use of a microcomputer for the preparation of the proposed town budget by the town budget officer would be a central-staff application, while the use of a microcomputer by a town highway superintendent to prepare budget requests for the highway department would not. Sixty-one (62 percent) of the 99 responding towns reported one or more central-staff financial management applications, and 48 (48 percent) reported one or more

central-staff word processing applications. For the remaining sixteen areas of applications, the next highest number of towns was the 23 (23 percent) that reported one or more real property tax applications.

Even for the two most common areas of applications, most of the respondents were not using their microcomputers for even half of the applications specifically described in the questionnaire checklist, nor did they describe many others on the blank lines. In short, the applications data help support the conclusion that towns as a whole were in the early stages of putting microcomputer technology to use at the time of the survey.

What factors might have interacted to make central-staff financial management and word processing applications the most common applications? One factor could be simply that, given the pries, quality, and "fit" with their needs of available software, most towns using microcomputers judged these applications to be those that would yield the highest initial payoffs. Part of this rationale could be that many of these applications -- for example, maintenance of the general ledger and payroll preparation -- serve the whole organization and, therefore, have been seen as higher priorities than applications serving specialized service and functional areas. Also, the central staff generally work most closely with the governing board, the ultimate controllers of the town purse strings. In some cases, this may have given them a significant advantage in pressing for acquisition of microcomputer systems for their use over persons in more specialized areas of town government who also want these systems.

Adequacy of Training for Use of Microcomputer Systems

The long-form data indicated that inadequate training may have been a significant problem for town microcomputer operators, especially those of smaller towns. The long-form respondents reported that training had been inadequate or non-existent for the use of 65 (39 percent) of the 167 microcomputer systems that they reported. Moreover, for the towns of each of the first three quartiles, these two answers were provided for more than 50 percent of the microcomputer systems. Even for the towns of Quartile 4, the training that operators received for use of 33 percent of the microcomputer systems reported was described as inadequate or non-existent.

These results are not surprising. Most knowledgeable local government officials recognize that by any reasonable standard the amounts expended annually for training by the overwhelming majority of local governments are inadequate. Moreover, in times of financial stress, amounts previously allocated for training are usually among the first to be seriously cut or eliminated. "Financially stressed" is a term that the officials of a great

number of towns probably would think appropriate for describing the financial circumstances of their jurisdictions during the 1980s.

It is possible, of course, to learn to use a microcomputer solely through such methods as studying instruction manuals, using tutorial diskettes, and the trail-and-error approach, but the costs associated with these approaches may far outweigh any savings from little or no expenditures on formal training. For the expected operator, these costs may include unrealistic work loads, unproductive use of time, frustration, and disenchantment with microcomputer technology. For a local government, the costs may include significant delays in realization of the benefits of using a microcomputer system, costly mistakes, such as erasing and even losing permanently significant data, and increases in resistance to microcomputer use among other town personnel who hear reports of frustrations and difficulties. Perhaps most significant are the possibilities that an operator may never learn how to perform certain very valuable operations and may learn to do others in very inefficient ways or in ways that produce substantially less than optimal results.

Number of Operators per Microcomputer

The long-form survey provided data on the number of persons operating the microcomputers used for town purposes "on a fairly regular basis." Sixty-one percent of the 167 machines were used regularly by one or two persons, 20 percent were used regularly by three persons, 7 percent were used regularly by four persons, and 8 percent were used regularly by five or more persons. More persons shared the use of microcomputers in the towns of Quartile 4 than in the smaller towns of the other three quartiles. This probably reflected the larger pools of potential users in the larger towns, the greater concentration of both microcomputers and potential users in centralized offices, and the greater needs of these towns to do the types of things that microcomputers are designed to do.

Access to Expert Assistance

The long-form survey provided useful data about three types of external expert assistance provided to operators of microcomputers used for town purposes: consultants retained on a continuing basis, consultants paid when their services are used, and citizen-volunteers with special knowledge of microcomputers. The operators of one-third of the 167 microcomputers of the long-form survey had access to one of these types of assistance. The type that is probably the most helpful -- a consultant retained on a continuing basis -- was the least commonly used. This arrangement was reported by only 14 of the 55 towns that reported

access to external assistance. In contrast, 20 towns reported help from citizen-volunteers, and 21 reported arrangements with consultants paid only when their services were used. Those operating microcomputers for the towns of Quartiles 1 and 2 had almost no access to the three types of external assistance (assistance for only 1 machine). The operators for the towns of Quartiles 3 and 4 were in a much better position (assistance for 54 machines).

The researchers expected that the smaller towns (those of Quartiles 1 and 2) would make significantly greater use of expert assistance from citizen-volunteers than the larger towns, but this did not prove to be the case. This probably reflected a relative scarcity in rural areas of residents who were knowledgeable of microcomputer technology. It also might have reflected a tendency for the few residents with this knowledge in rural areas not to have social, business, and political interactions with those involved in town government. The making of the arrangements for a person to serve as a volunteer expert may require that, first, a high level of confidence in her or his knowledge be established through such interactions.

Key Limitations Experienced with Microcomputer Systems

The long-form questionnaire asked respondents to indicate in their own words "the most important limitations or problems you have experienced in using this microcomputer." One or more limitations or problems were identified on 120 questionnaires and were grouped into 31 general answers. Only two of the answers were given significant numbers of times, namely, "need for training" and "inadequate software." The former was the response given most frequently by respondents from the towns of each of the 1980 town population quartiles, while the towns of Quartile 4 accounted for 80 percent of the "inadequate software" responses. The frequency of the "need for training" answers, given in response to an open-ended question, greatly reinforces the evidence cited earlier that inadequate training has been a serious problem for town microcomputer users.

Advice from Respondents to Other Local Governments

The final question of the long-form survey asked the respondents to draw upon their towns' experiences with the microcomputers on which they were reporting to provide their "single most important bit of advice" for another jurisdiction interested in acquiring a microcomputer. Responses were provided by 106 respondents and grouped into 14 broadly stated answers. Half of the 106 responses provided advice relating to the processes of buying hardware, software, or both. This was also

the most frequent answer for the towns of each of the 1980 town population quartiles.

While the answers relating to the processes of selecting software or hardware or both were diverse, most of them provided summary versions of the procurement process generally advocated by those knowledgeable of microcomputer technology or emphasized certain aspects of this process. In greatly simplified terms, this process recommends these steps: choose the tasks to be computerized, choose the software to do these tasks, and then select the microcomputer that will run this software. The extent to which the long-form respondents emphasized this recommended process provides a strong confirmation from actual town experiences that a decision to follow the advice of the experts is a wise one.

One respondent expressed the essence of both this process and his own department's experience in this statement:

> "Go out with a list of things you want the computer to do. Find the programs you can get, then choose your computer. Don't buy the computer and then look for the programs and find out you can't get any that you need. That's what we did."

IV. THE TOWN MICROCOMPUTER USE DATABASE

As noted earlier, the researchers hoped that the town microcomputer use survey would generate information that might be used for educational and technical assistance endeavors beyond those in which the Local Government Program was already engaged. A particular project that the researchers wanted to pursue was the creation of a town microcomputer use database that a particular town could use to attain helpful information on microcomputer use by other towns. For example, this database would enable a town interested in acquiring a microcomputer system for water service billing to identify and to contact "other towns like us" that were doing computerized water service billing. This concept was included among the approaches for helping towns acquire and use microcomputers that respondents were asked to rate on the short-form questionnaires. In addition, it was anticipated that much of the information requested on the long-form questionnaires would prove useful for constructing the database.

Although the short-form respondents rated the concept of the database quite favorably, it has not been possible to undertake the time-consuming tasks of creating and maintaining the database and promoting its use by towns. Unfortunately, during the analysis of the survey data, the Local Government Program suffered a major personnel reduction that left it without the resources needed to continue working on the database. Attempts

to attain grant monies to fund this project's completion have not yet been successful. Much was learned from the town microcomputer use survey, however, that could facilitate further work on such a database.