The Impact of Computer-based Information Systems on Latin American Planning Agencies

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ABSTRACT
Latin America has had a twentieth-century history of adopting technological innovations that originate in the developed world. History also demonstrates that these innovations are adapted to social patterns of behavior that are distinctively Latin. The purpose of this paper is to briefly describe the technological phenomenon of the rapid diffusion and improvement of personal computers and, given twentieth century experience of adaptation and adaptation, speculate concerning the probable impact of the introduction of these machines into the daily practice of regional and urban planning within Latin America.

An innovation wave of enormous consequence has coursed through North American, European and Japanese societies during the past decade. It is now in the process of breaking upon the shores of Latin America. The wave began with the Apple II computer in the late 1970s and gained momentum with the introduction of the International Business Machine's personal computer (hereafter called by its familiar acronym IBM-PC). In 1983, Apple Computer Corporation introduced its Macintosh model, which featured a graphical interface. This gave program commands an arcade flavor and thus attracted a generation of young people who had been brought up on television and many of whom were quite familiar with arcade games in malls. For a while, the IBM-PC and the XT and AT models that followed it dominated business uses while Apple dominated the educational and home use niches. In the meantime, many other companies entered the business with IBM clones and business soon became highly competitive. Towards the end of the decade, the desk top machines became powerful enough so that they were of immense value to architects, accountants, engineers, writers, librarians and scientists. Basically, the machines began to perform much more efficiently routine tasks such as typing a manuscript or doing business mathematics with bookkeeping data or keeping track of invoices and payrolls. This innovation wave occurred almost simultaneously throughout the developed capitalist world although there were three clear leaders; namely, the United States, Japan and France. It is fair to say that the use of personal computers have become nearly universal at American universities and colleges as well as public and private libraries of all sorts. As for ordinary business office work, it is fair to say that the degree of market penetration within the United States is approaching 100 percent within a period of only twelve years or so since the introduction of the Apple II.

Besides diffusing at an extremely high rate, the capabilities of the PC have increased rapidly both in terms of hardware and software. Seven years ago, the standard PC used an Intel micro-processing chip with a 4.77 Megahertz (Mh) clock and an 8 bit bus. By 1990, the standard PC now featured an Intel 80386 SX micro-processing chip with a 16 Mh clock and a 16 bit bus and is about 20 times faster than the original IBM-PC with a double floppy drive. Current top of the line PCs, sold in large numbers, sport a 33 Mh clock and a 32 bit bus. The top of the line PC today is, literally, orders of magnitude faster than the "original" PC of barely a decade ago. The cost of active memory (RAM) and permanent data storage on hard disks and floppies seems to decrease by half every four years or so per megabyte. Display terminals, communications devices and peripherals such as printers and mouses also have witnessed enormous improvements in quality and decreases in prices. Put together, the 1990 version is orders of magnitude better than the machines that introduced the revolution a dozen years ago. "New" came to mean less than a year since introduction, "standard" lasts one to three years, "old" is three to five years and "ancient" refers to any machine technology more than five years old. This is one case where the use of the term "technological revolution" is not abusive of the English language.

Concurrent with the fantastic rise in power and quality at comparable prices is the growth of software capabilities. As one example, word processing programs are many times more sophisticated and user friendly than the versions of Wordstar and WordPerfect of five years ago. Spreadsheet programs now manipulate really large **[end p. 325]** matrices with ease and perform rather sophisticated mathematical and statistical operations as well. Graphic packages, both stand alone and attached to other programs such as spreadsheet and data base programs, have proliferated and become ever more powerful. Multivariate statistics packages of the kind which led the quantitative revolution in American geography a quarter of a century ago, such as SPSS-PC and SAS, now occupy a rather modest corner of my hard disk and, in fact, do stuff in a matter of minutes that we never dreamed of doing twenty years ago. First rate linear algebra and calculus can be done with GAUSS and MATHEMATICA or MAPLE. To do better mathematics relevant to the social sciences one would need graduate level training. And it is all becoming user friendly with pop-down menus and pointing mouses and color charts and so forth and so on. Cartography and geographic information systems (GISs) do require the computing power of a work station such as a Sun or Sun Spark in order to be both fast and flexible. I am told that PC versions tend to have the scope of demonstration packages. Even so, simple programs *are* available for the PC and the cost and power of GIS programs are rapidly reaching the point where every geography department can afford one and pretty much none can afford *NOT* to have one. Increasingly scholars are limited only by the imagination of their proposals, hypotheses and models in addition to the usual lack of good quality data. The in-between drudgery is rapidly disappearing.

The relevance of these vast changes to Latin American society lies in the fact that Latin Americans have yet to experience the widespread impact that these machines have upon the functioning of both public and private organizations. And that impact, make no mistake, will be substantial. However, Latin Americans have spent much of the past century slowly adopting and adapting technological change from the north. I do not doubt for a minute that they will incorporate the desk top computer in a style that is inimitably Latin.

The purpose of this paper is to sketch out some of the pathways by which this technological change will be incorporated into the continuing stream of Latin culture and to assess some of the probable consequences of that acceptance both for the organizations themselves and the people they are supposed to serve. Artifacts such as a PC are, in the beginning at least, value neutral in the sense that people will do with the machines pretty much as they did before only now with greater speed, accuracy and efficiency. Second, all mass produced and consumed artifacts that are functional rather than decorative ultimately change routine patterns of behavior. These changes in routinized behavior often but not always lead to a change in attitudes, values and beliefs; that is, to a change in the prevailing culture. Finally, communications devices particularly have had a history of changing social values and influencing changes in social structures. Just consider the home television set.

It should be noted at this point that the generalizations concerning "Latin" bureaucrats and similar group references made in this essay are *not* based upon statistical analysis of formal survey research either directly by the author or indirectly by citation of other work. Rather, they represent personal impressions which the author has gained as a result of visits to Latin America over the past few decades. Rather than obscure the speculations made by constantly injecting statements such as "it is my impression that..." or "it appears that ..." which may make the exposition turgid and/or limp, I choose to forewarn the reader here that no survey has been conducted or cited and that, therefore, all of the statements made hereafter rest on speculation informed by personal observation. It is for the reader to judge whether or not the qualitatively obtained generalizations are informed by "checking" the observations which I summarize against their own experience. In addition, I urge that we conduct such surveys because understanding this process is a key to understanding the role of regional and urban analysis in planning in Latin America. This is a very new phenomenon. Even in the United States the vast majority of machines and software programs are less than ten years old and frank speculation may be warranted at this time in order to posit hypotheses and propose

tentative predictions. In this sense, this paper is more of an speculative essay than a formal report of research findings.

The PC revolution has the potential for creating structural change in Latin American culture. For one thing, it makes rather sophisticated procedures literally accessible to a vast population of users which, eventually, will number in the tens of millions. These will be middle-class people who would otherwise not have the education or experienced-based skills to master complex procedures but who are sufficiently literate and numerate to comprehend and use menu driven programs. Potentially, this can eliminate the need to organize masses of people to accumulate, manage, manipulate and analyze complex data-based systems. Latin difficulties in managing hierarchically organized bureaucracies mitigate against efficient execution of large scale activities. Among other traits, they prefer to decide most things in the course of endless "reuniones" in an effort to achieve consensus. On-line, interactive communication systems along with electronic transmission of data files may prove to be a close **[end p. 326]** enough substitute to work, and it leaves an electronic record that might lend greater precision to group decisions. Of course "reuniones" being social gatherings that serve social needs will still exist but one can hope that their frequency will diminish in direct proportion to their utility.

The ability of "everyman" to do such routine but critical tasks as word processing will both shorten the time between conclusion and report and allow for much better copy editing. I have observed that most Latin males in hierarchical positions in government offices will not touch a typewriter but might be persuaded to manage a word processing program on a desk top computer. The same may be said of spreadsheet work and the use of presentation graphics. The ability of many bureaucratic politicians to manage an office budget let alone conduct an economic analysis for their putative clients is actually rather shaky. Reports are written in great profusion with at best two or three copies. The filing system is often chaotic. Important paper is lost very frequently. Often, the people who need the information do not get it. The vast bulk of many facility and site analyses are repetitive to the extreme, boring and uninformative. The same piece of landscape is described in the same trite way over and over again. When someone gets a bright idea it rarely is shared among more than a few associates.

Worst of all, there is no effective library system in most of the agencies I have visited over a period of a quarter-century. Since top management is hired on the basis of personal and political connections rather than training, experience or track-record, and since many institutions do not keep a usable record of previous work, the entire institutional memory and, hence, expertise rests on the shoulders of under-paid and over-worked middle level civil servants who need to exercise due caution in expressing their ideas and some of the unhappy facts of life to the ever-new management because democracy and respect for dissent within bureaucracies is a rather random event. So, many technical agencies who can impress a visitor with a surprising level of professionalism in the form of degrees granted and knowledge of the developed-world literature on a particular topic among its staff may, in fact, have not acquired nearly as good a knowledge of what works and what does not work at the local level as one would expect given the millions of dollars and numbers of decades spent on a narrow task over decades of time.

Latins tend to be rather precise in their elaboration of a *nomenclatura* that is functionally organized by topic and sometimes divided by region. Thus, we have a national planning office for practically anything an international lending agency will support. Most offices are top-heavy with *políticos* many of whom have foreign degrees. Invariably, the majority of every agency's employees are located at headquarters. In terms of budget, it is likely that an even higher proportion is spent in the national capital. Central staff rarely visit offices in the field even when the agency deals in agriculture, natural resources and the like. In fact, there rarely is a budget for "*viáticos*" or travel expenses for anyone but the very top people even though key technical personnel have a vital need to visit the places they talk about and plan for. Communication between colleagues in headquarters and in the field who are closer to the subject at hand is a chancy and

poorly organized thing. We can only observe that the critical clientele for Latin American development agency runs upward rather than downward in terms of source of funding, appointive power and the ability to make judgements concerning performance. We *gringos* complain incessantly and rightfully about the inattentiveness, rigidity and monumental stupidity of our Washington based bureaucracies. The sad truth is that the situation in most Latin planning organizations is actually much worse than it is here.

Enter the personal computer. Clearly, this device will not change the political and bureaucratic culture of Latin America. By no stretch of the imagination can these machines and associated software be seen as a panacea. The thesis of this paper is that, nonetheless, the machine and its associated software applications eventually will cause a profound change in the way in which these bureaucracies function. Perhaps as a result, these functional changes will lead to changes in the goals that are perceived as attainable and therefore to the role that these organs play in national life. Since speculations of this sort are highly problematic, I restrict the extent of speculation to what I perceive as the most probable outcomes and refrain from hypothesizing time tables.

THE PC REVOLUTION IN LATIN AMERICA: SIX PROBABLE OUTCOMES

1) Computers will make it easier for individual staff members to keep a cumulative file of their own previous research efforts. Much of what gets done in a planning office is very repetitive. Therefore, there is a lot of "boilerplate" text that can be usefully merged into a new project file. The savings in staff time can range from **[end p. 327]** significant to enormous depending on the work of the agency.

2) Individuals can accumulate their own data bases both in statistical and graphical form. As they work through each new project, their data base enriches. Much urban and regional planning especially in smaller countries refers to the same areas over and over again for particular staff members. The ability to call upon an accumulated data base and then be required only to up-date it can cut the time cost of evaluating a project significantly. Since much office time is spent in group meetings, the ability to quickly assemble relevant data will surely have some positive impact on the quality of the decisions even though it is extremely doubtful that Latinos will forego their own particular style of decision-making.

3) In fact, urban and regional planning offices do very little data analysis. They either work qualitatively with subjects which are often essentially quantitative in nature or they contract out to both domestic and foreign consultants. While I recognize that employing outside consultants has the great advantage of avoiding responsibility for drawing conclusions that can incur the ire of *políticos*, the simple ability to duplicate some work in-house will greatly improve the quality of the outside work produced and received. Besides, it is possible to write requests for proposals that call for more direct data gathering with the agency doing more calculation in-house. The improvement in the quality of the reports could be substantial. Besides, planning agencies that produce their own final analyses are in a much better position to fully appreciate and understand the reports received.

An ordinary, "garden variety" PC can store the equivalent of an undergraduate major in statistics and mathematics on its hard disk. Access to these programs becomes more user friendly every year. Latinos actually have much better basic mathematics training than their Anglo counterparts. After the fear of using something new is overcome, the numbers of planners who can learn to make good use of these quantitative resources are very high. This could raise the professional quality of the work produced by an order of magnitude. The result could be to objectify the intermediate steps of a plan that will make the underlying premises all the more obvious. Once again, poorly set goals and the actual possibility of deliberate data corruption can not be solved by the use of mechanical devices even ones as sophisticated as PC hardware.

4) Perhaps the most important benefit of the use of PCs in urban and regional planning offices can be

obtained by creating a local area network or LAN. The entire office could then share common data bases. It will be possible to add continually to the common data base as well as update it. The amount of drudgery being conducted by hundreds of poorly trained and poorly paid employees in a multitude of planning agencies could be reduced by 90 percent; that is, productivity could be raised by an order of magnitude, by this simple step. One could hope (or perhaps dream is the better verb that different sectoral agencies dealing with the same pieces of real estate would share data bases.

5) The impact upon the internal structure of planning agencies of adopting and adapting these changes could be very substantial. Some of these changes could be beneficial and benign while others undoubtedly will be pernicious and evil. The gains in efficiency of the use of human resources have already been alluded to in previous sections. The gains in data accuracy as data bases are maintained, cleaned and refined will be substantial. The possibility of directly a great proportion of staff to actually visiting the people being planned for is implicit as well as the new found ability to monitor on-going projects and to learn from experience. The new *licenciado* arriving as director, an event that occurs approximately every 20 to 30 months in many planning agencies, can be educated as to what is going on much faster if there exists a data base of previous reports as well as a review of who is doing what task at what rate in which area on a personal computer available in his/her office. It is possible for the new director to bring a few well trained specialists in to review and evaluate the performance of the agency with salutary effects..

6) The *políticos* who administer most planning agencies are unlikely to understand the mechanics of data base management. Nor is likely that they will care very much because being competent is not how they got the job in the first place nor is how they hold the job during the short time they are there nor does performance determine which job they get next. Occasionally, a director can make a reputation for outstanding performance that either makes him invulnerable to being tossed out, provided he/she is flexible enough to make the next political transition), or gets him another post in the new government or may land him an influential consultant's role to the new regime. However, most directors can understand the value of a smoothly running system that can quickly adopt to new **[end p. 328]** priorities without a long start up period. Some bureaucratic politicians can gain an edge by developing a reputation for scientific management and progressive views.

An efficiently run network of computers can be dangerous to liberty and to justice. Evil directors can assemble small groups of technicians who can afford to ignore the inefficient but basically honest middle-level civil servants in an agency. The computer would greatly facilitate the mismanagement of such a director.

It is clear that PCs will transform the process of planning in Latin America. Whether the effect of the transformation predominantly will be good or evil remains to be seen. Latin American will adapt the computer to their own style of human organization and, in turn, be changed by the adaptation. It will be interesting watching the process unfold.

A final word is in order. Much of what was said in this essay applies with equal rigor to bureaucratic life in Anglo-America and may be true elsewhere as well, although I can not say having had no personal experience with regional and urban planning offices elsewhere. This has been an attempt at an unusually frank appraisal of the process of planning in Latin America and not an attempt to attack or denigrate the many fine and dedicated professional planners in Latin America.

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