

With comments
- B. P. King

Development Information Needs and Uses in the Pacific Hemisphere Community

What They Are and How the New Telematic Technologies Can Meet Them

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Technologies that can improve the timely delivery and use of population research findings and methods can help relieve economic, social, and political pressures in countries with high rates of population growth. A study of population-information needs and modes of information dissemination and use among policymakers in the Pacific Hemisphere Community (PHC) suggests that direct contacts between policymakers and researchers stimulate the use of research findings in policy formulation. New telematic technologies have the capability to facilitate such contacts. We describe how the emerging PHC telecommunications technical infrastructure, and new telematic media in particular, can be used to help meet policymakers' information needs, and we present a proposal for the improved movement and management of population and other development-related information for the 1990s.

INTRODUCTION

New information technologies have launched the 'Information Age,' an era in which the majority of people are primarily engaged in generating, processing, communicating, interpreting, and evaluating information and its supporting technologies.

Research-based population information has a vital role to play in the development of the PHC, as an essential resource for intelligent local, national, and international problem-solving. Although the popular notion of a global

'population bomb' has to a large extent been defused, and a growing number of countries are achieving stable and even negative rates of population growth, exceptionally high rates continue to plague less-developed countries in the South Asian and South American regions of the Pacific Hemisphere Community. Their policymakers need information to help them solve their population problems.

Yet, the problem does not lie in a dearth of information. On the contrary, population information (like many other types of information) is accumulating so fast internationally that it is ex-

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tremely difficult for scientists and practitioners to keep informed.

Exacerbating this problem of overload are faulty dissemination practices, inadequate communication management, and understocked and understaffed document distribution centers. Such failings as these make traditional methods of physical movement and management of information and access to the growing stocks of population information resources very difficult for all but the most fortunate policymakers.

Even when access is possible, language barriers impede information use, and where there is a common language across cultures, different cultural contexts sometimes confer very different meaning or significance to words in use.

The rapidly changing information needs of policymakers, as well as the interdisciplinary nature of the population field, further exacerbates the information delivery problem, as does the lack, in many countries, of adequately developed indigenous information infrastructures. Some countries thus have more information resources than others, widening the information-rich/information-poor gap and adding to international tensions.

THE CENSUS FORUM STUDY

The Asian and Pacific Census Forum (since renamed Asian and Pacific Population Forum), a quarterly publication of the Population Institute of the East-West Center in Honolulu, is an example of a conventional vehicle for the supply of population-related information to policymakers. The information supplied is based on research conducted at the Institute and other centers of population learning.

To find out to what extent the Forum was reaching its audience, meeting the audience's

needs, and achieving policy impact, the Population Institute and the U.S. Agency for International Development (which supports the Forum) sponsored a study of information needs and uses among Forum readers.

The first part of this paper presents some of the key findings from that study. The second part conceptualizes and compares the potential of new versus conventional communication technologies for delivering information to policymakers in the PHC and other regions, with a view, ultimately, to stimulating the spread and use of policy-relevant social-scientific research findings.

Study Method

Data for the study were collected by means of a 69-variable survey questionnaire administered to readers of the Forum on behalf of and in cooperation with the East-West Center and the U.S. Agency for International Development.

The instrument was inserted in the November 1985 issue of the Forum, which was distributed to subscribers in 88 countries. Table 1 shows the distribution and responses by region. PHC

Table 1. Census Forum distribution and survey response rates, by region (April 1986)

Region	Total copies mailed	Percent of total distrib.	Regional responses:	
			No.	Rate
Asia	1067	54%	135	12%
Pacific	161	8%	33	20%
Latin America/Caribbean	29	1%	1	14%
Africa	35	2%	5	14%
Near/Middle East	27	1%	2	7%
Europe	100	5%	31	31%
North America	568	29%	168	29%
Unknown	0	0%	7	0%
TOTALS	2022	100%	385	19%

regions are clearly and appropriately well represented among the responses. Asia and the Pacific islands combined take 62 percent of the distribution.

Altogether, 385 responses were received from 2,022 subscribers, a 15-percent return and a respectable one for a cross-cultural survey of this nature.

In addition to the subscriber, a median 2.0 other people read each copy. The true audience size is thus over 6,000 (3 readers x 2,022 copies).

Analytic Model

Variables in the instrument that relate to information needs and uses were grouped into three kinds of factors: network factors, psychographic factors, and demographic factors. The complete analysis of these factors will be reported elsewhere. This paper is concerned only to describe the geopolitical level

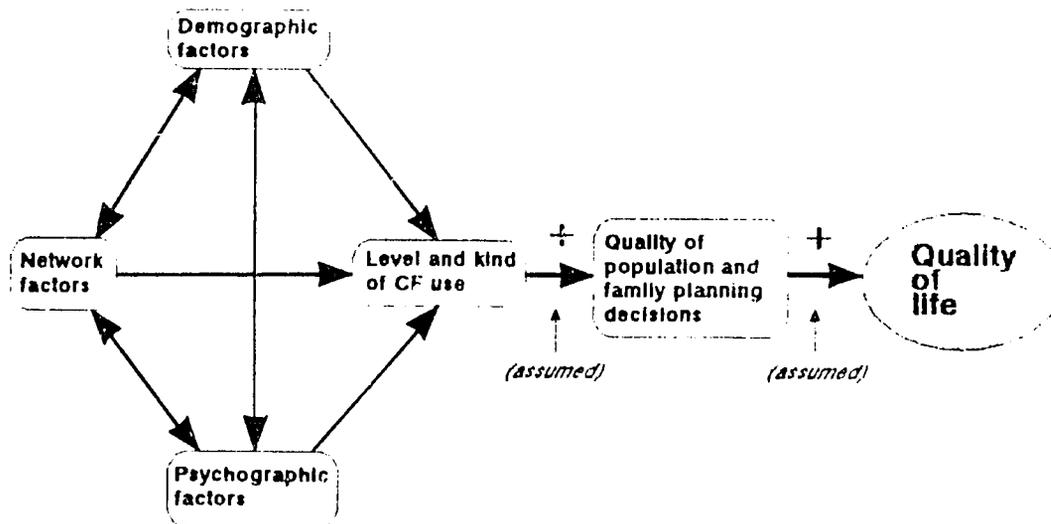
and the kind of use ('instrumental' or 'conceptual,' defined below) of Forum information among policymakers and (for comparison) among non-policymakers, especially within the PHC, and to elucidate briefly on their particular demographic-information needs and topical interests.

We assume in our model (Figure 1) that population-information use has a positive influence on the quality of population-related decisions taken by policymakers ('quality' as measured by social and economic consequences), and that the quality of policy decisions influences the quality of life of the people governed by them.

Definitions

'Policymaker' is defined as someone who has direct influence on setting population goals and priorities. A fundamental assumption of the study is that this definition is valid.

Figure 1. Census Forum study: Analytic model



'Instrumental use' is defined operationally as any identifiable impact on some immediate decision respondents had to make.

'Conceptual use' is defined as any impact on respondents' thinking, awareness, or understanding of demographic issues in general.

The Sample

The mean age of the sample is 44. Fifty-seven percent of respondents have doctoral (or equivalent) degrees. Sixty-eight percent have had some training in demography. English is the primary language of over 70 percent of respondents. Nearly 90 percent found the Forum easy or very easy to read.

More than a third of all respondents make some contribution to establishing population goals and priorities, and are therefore 'policymakers' according to our definition. Half of the policymakers have influence at the national level, with the remainder spread roughly evenly across worldwide, regional, state, and local levels.

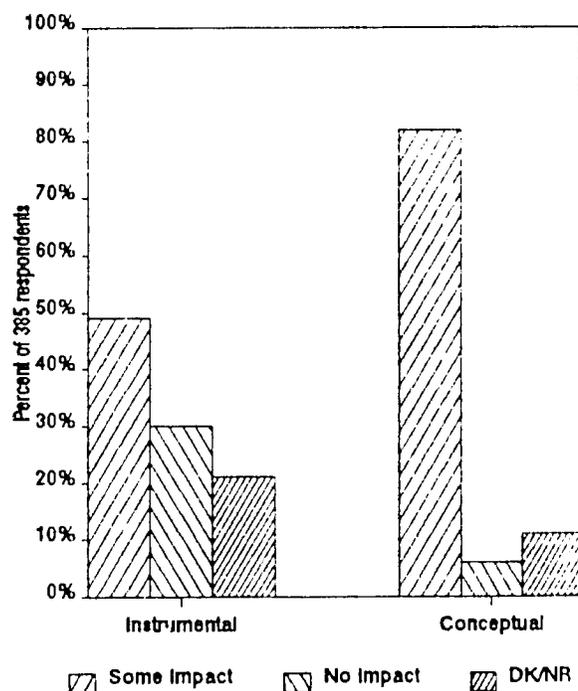
Kinds of Information Use

Half the total respondents reported that the Forum had impacted some immediate decision they had to make ('instrumental use'), while four-fifths said their thinking, awareness, or understanding of demographic issues had been enhanced by a Forum article(s) ('conceptual use') (Figure 2).

The policymakers showed a 3:2 greater propensity than non-policymakers to use information instrumentally (Table 2). Most of the examples of instrumental use given by policymakers had to do with the adoption of research methods and demographic estimation techniques. Among the examples given are:

- 'I recall making direct use of the article on microcomputers in census work for a UN policy debate.'
- 'Use of methods . . . in regard to a suggested population research contract, on feasibility of control measures for handling problems arising from rural to urban migration and rise of squatter areas.'
- 'Consulting with Indonesian government officials concerning the Census.'
- 'Decision to undertake New Zealand Census undercount evaluation/research (dwellings).'
- 'Used ideas from Census Forum in relation to 1989 Kenyan Population Census.'

Figure 2. Kinds of information use



Conceptual impact amongst both groups is even higher, at 90 percent for policymakers and 79 percent for non-policymakers (Table 2). Examples of conceptual use given by policymakers are:

- '... understand other countries' census quality, procedures, problems, etc.'
- 'Coverage on the population planning and demographic research in PRC ... helps keep me abreast of new developments.'
- 'Issue concerning the impact of [China's] 'one-child family' [policy] which might not be proper for our country, since I am currently involved in drafting the national population policy in Indonesia.'

- 'General awareness and sensitivity to developments in population and development issues.'

The study found that Census Forum articles have had greater instrumental impact among policymakers in the Asian and Pacific regions combined than among policymakers in other regions or among non-policymakers generally. An important related finding is that 70 percent of the policymakers (and half the non-policymakers) from Asia had visited the East-West Center. We discuss the implications of this later in this article.

Needs and Interests

The survey instrument was designed to elicit respondents' primary areas of interest, by sub-

Table 2. Percent and kind of Forum knowledge use

	Non-policymakers		Policymakers		Policy-making role not reported		Total	
Instrumental use								
Yes	92	(42%)	83	(62%)	12	(40%)	187	(49%)
No	84	(38%)	28	(21%)	5	(17%)	117	(30%)
Don't know	37	(17%)	17	(13%)	9	(30%)	63	(16%)
Non-response	8	(4%)	6	(4%)	4	(13%)	18	(5%)
Total	221	100%	134	100%	30	100%	385	100%
Conceptual use								
Yes	175	(79%)	120	(90%)	21	(70%)	316	(82%)
No	20	(9%)	5	(4%)	1	(3%)	26	(7%)
Don't know	21	(10%)	6	(4%)	5	(17%)	32	(8%)
Non-response	5	(2%)	3	(2%)	3	(10%)	11	(3%)
Total	221	100%	134	100%	30	100%	385	100%

ject area, and specific needs for demographic information, by topic.

Population and family planning, as might be expected, are the primary areas of interest. Forty-eight percent of the audience as a whole, 53 percent of the policymakers, and 30 percent of the non-policymakers selected these primary-interest areas.

However, specific demographic information needs included demographic information affecting primary-interest areas besides population and family planning. For example, over 40 percent of respondents need information relevant to development planning, an indication of the concern among respondents for the less-developed countries.

Among policymakers there is substantial need for information not only in the form of population statistics but also about methods for demographic estimation. Social mobility, development planning, education, and natural resources/the environment are also prominent among policymakers' information needs.

In terms of regional interest (that is, regions about which respondents want information), Asia and the Pacific are of primary concern to the respondents, though the study found substantial need for information about other regions, notably Latin America and Africa.

Thirty-eight percent of the policymakers expressed interest in the Pacific islands, second only to Asia (75 percent). Policymaker interest in North America (31 percent), and in the non-PHC African region (29 percent), is also high.

DISCUSSION

The Census Forum is a relatively technical publication based mainly on demographic research, with fewer inputs from other social sciences. The literature on knowledge utilization has tended to downplay somewhat the notion of social-scientific research having direct instrumental impact on policy, in part at least because such impact is difficult to measure and data are rare.

The data gathered in this study, indicating a high degree of instrumental use of research-

'To improve the utilization of valuable social-scientific knowledge, and thus to improve the quality of life, new ways of networking between researchers and policymakers must be found.'

based information by policymakers, are therefore significant.

These data show that the Forum has a considerable direct impact on the establishment of population goals and priorities, particularly at the national level, where half the policymakers have influence. It would seem reasonable to infer that the very high degree of conceptual impact found to exist among policymakers has an indirect influence on policy-making (cf. Bulmer 1982 and 1986, Caplan 1980, and Weiss 1977).

The combined effects of these direct and indirect impacts could well be greater than the sum of their separate impacts.

Face-to-face networks

It is significant also that a high proportion of the policymakers who reported these impacts had visited the East-West Center, where much of the research reported in the Forum is conducted. This finding empirically supports the common-sense notion that direct contacts between social science researchers and policymakers in related areas helps to increase

the utilization of research. In fact, the major premise behind the original publication of the Forum was that it should support and foster interpersonal linkages forged at regional census conferences, with a view to stimulating the adoption of research findings and methods.

However, conventional dissemination media—even one so evidently successful as the Forum—cannot, by their very nature, supply all the elements of face-to-face meetings.

Face-to-face interpersonal contacts of course involve considerable expense. The PHC covers a vast area, and travel costs alone can be prohibitive, especially for policymakers in the less-developed countries.

But besides the high costs involved in traditional methods of establishing face-to-face interpersonal contacts, the costs of print and other traditional forms

of publication are also high. A single issue of the Census Forum, for example, costs roughly \$20,000 to produce and distribute to a relatively small and narrowly-focussed group.

Therefore, to improve the utilization of valuable social-scientific knowledge, and thus to improve the quality of life among such countries, we argue that new ways of networking between researchers and policymakers need to be found.

Supplying face-to-face elements

Explored below is the potential of new versus conventional information technologies for delivering information to policymakers in the PHC, with a view to stimulating the spread and use of the information. New technologies have the capability today to meet many of the criteria for effective communication associated

with face-to-face meetings and at a much reduced cost per unit of information delivered.

We discuss how the emerging PHC telecommunications technical infrastructure, and the new information technologies in particular, can be used to help meet the needs for population information identified in the Forum study. We outline a blueprint for the improved movement and management of population and other development-relevant information for the 1990s.

THE ROLE OF TECHNOLOGY

Information technologies are instruments to help eliminate uncertainty about some desired outcome. Population communication outcomes

... data are rare. The data gathered in this study, indicating a high degree of instrumental use of research-based information by policymakers, are therefore significant.'

can be categorized broadly as changes in an individual or group's Knowledge, Attitudes, or Practices (often called 'KAP' variables by com-

munication researchers).

Information technologies were once considered to be neutral in the communication process. They remained in the background, while population information officers and dissemination experts focused on other variables in the information transfer process—such as source credibility, the order in which material was presented, and the semantics of scientific communication. But during the late 1960s and early 1970s it began to be apparent that the technologies themselves, under some circumstances, could account for a great deal of the information transfer.

A greater understanding of the role of technologies in the communication process, especially those newly emerging, is therefore important in solving seemingly intractable problems of information dissemination and use.

New Information Technologies

How do the characteristics of new information technologies differ from the old or conventional technologies? At least four primary characteristics have been identified (cf. Burns 1984, Dor-dick and Williams 1986, Horn 1988, Rice and associates 1984, Rogers 1986, and Williams 1987).

1. Interactivity

The first and most distinguishing characteristic is 'interactivity,' which permits the end-user to 'talk-back' to the medium and actively participate in selecting both the receiving channel and message content. The level of personal involvement is much higher, multiplying the potential impact many times over. The potential impact and cost-effectiveness are therefore much greater.

'The new information technologies provide interactive opportunities not available from conventional media.'

A highly interactive system can be interrupted almost instantaneously, an attribute that has been termed 'small-interval granularity.' Users of a highly interactive system can also depart from it easily or 'gracefully,' without system disruption or abrupt 'degradation.' A highly interactive system does not require the user to be able to think very far ahead: the user can explore an information base without having a definite goal in mind ('limited look-ahead'). Highly interactive systems also give the user the illusion that the information base is nearly infinite, by allowing almost unlimited pathways to explore.

It is these five primary attributes (interruptibility, small-interval granularity, graceful degradation, limited look-ahead, and database infinity) that make for the highest degree of system interactivity (Negroponte, interviewed in Brand 1987). The new information tech-

nologies provide interactive opportunities not available from conventional media.

Human-machine interface designs and human-factors engineering open up a variety of interaction styles—ways in which people can communicate with technology (Shneiderman 1987). An example of such a style is the traditional command-driven mode associated with computer programs. A command is a signal sent by the user to the system to make it do something.

Menu-type structures, form fill-in templates, and even direct manipulation are also now in wide use. Thus, people are able to communicate with the new technology in the same way they communicate with each other: by looking, listening, touching, or talking.

2. De-massification

Second, the new information technologies are not 'mass' media in the conventional sense of print media, direct broadcast radio, television, and cinema. One-to-many communication (one sender, many receivers, as in traditional broadcast media) are still possible using the new media. But the new media also allow communications from one to one, many to many, one-at-a-time among many, and even many to one.

The traditional breakdown of communication channels as either interpersonal or mass thus no longer holds. The new information technologies have some characteristics of both.

De-massification means that control shifts from the message producer or sender to the media user or consumer. Examples of de-massified

media are interactive cable television, electronic mail (E-mail), audio or video teleconferencing, and computer conferencing.

Perhaps the most striking application of a de-massified medium is 'NewsPeek,' an interactive electronic newspaper that can be customized to match each individual reader's information needs (Brand 1987). NewsPeek draws its material daily from several established news sources, including broadcast television, but presents only material likely to be of interest and use to the individual reader.

By contrast, in the first place, the individual reader has almost no control over the editorial selection of material that goes into a newspaper, which amounts to only ten percent of the material available to the editor. In the second place, the average reader reads only ten percent of the copy that does get published in the newspaper (Brand 1987, citing Smith 1980).

3. Digitization

The third distinguishing characteristic of new information technologies, 'digitization,' makes possible the complete integration of voice, video, and data communications in a single network. All three modes can use the same transmission channel simultaneously and can be displayed and overlaid or superimposed on split screens or layers of pop-up or pull-down windows.

The entire global communication system will eventually be digitized, through Integrated Services Digital Networks (ISDNs). Already in limited service in Europe, Japan, and most recently the United States, narrowband ISDN networks permit simultaneous voice and data transmission over a single standard telephone cable. Planned wideband (optical-fiber based) ISDNs will include simultaneous full-motion video transmission capability. Wideband ISDN

will be able to deliver personalized NewsPeek to subscribers anywhere.

4. Asynchronicity

Fourth, the new technologies are 'asynchronous'—that is, the audience or end-user of a message does not have to be synchronized with its sender or source. Conventional electronic media are synchronous. For example, for ordinary telephone conversation to occur, both the called and calling parties have to be by their telephones at the same time. Conventional radio and television also require sender and receiver to be on the system at the same time in order for a message to be exchanged. With new information technologies, messages are simply put on the system and receivers can retrieve them at any time. Again, control shifts from the message sender to the information user.

Today's electronic messaging technologies are already so advanced that the push of a button can selectively accept, reject, or retrieve from storage messages from pre-identified people or places. Once a PHC ISDN is in place, a person can be reached as he or she travels anywhere in the region, and perhaps in the world, via the person's name or code number.

Other characteristics

Depending upon one's definition, technology may have other characteristics. For example, new systems can contain feedforward or needs-assessment sensors. Some theorists suggest that the new information technologies are self-generating (in a 'living systems' rather than a biological sense), since they may serve not only their maker's purposes but also their own.

A fifth-generation expert system, for example, can generate outputs known only to itself. These outputs become inputs that let the sys-

tem draw entirely new inferences. Expert systems should soon find applications in the delivery of research-based population information (Horn 1986).

New information technologies also offer new ways to format information, or increase the formatting options available.

True transnationality (open transborder information flow) and a level of message diversity previously unimaginable have also been identified as unique properties of the new information technologies.

Storage Technologies

Just two years ago (in 1986), integrated digital voice, data, and video products such as CD-ROM became available on the consumer market. 'CD-ROM' (compact disk-read-only memory, requiring a computer terminal and CD reader) is a small plastic platter that uses laser optics to store information in digital form. A single platter can hold four copies of the Encyclopedia Britannica on just one side. It can hold every word of the 21-volume Academic American Encyclopedia, with room to spare. That is equivalent to about 24 large textbooks on demography, or 100-million English words. The user can randomly access any one of those words instantly. Micronics (miniaturization) is key to these advances.

Falling cost is another positive factor. The cost of storing information on magnetic media has dropped about 40 percent, compounded annually for the past 20 years. In the same period, the cost of computer memory has dropped about 28 percent annually, and land-based communication costs have fallen about 11 percent annually.

Telematics

The convergence of telecommunication and computing technologies—combined with such revolutionary message transmission techniques

as digitization, fiber optics, and satellites—led the International Telecommunications Union (ITU) to coin the term 'telematique,' or 'telematics' in Anglicized form. In

Japan, the same concept is known as 'C&C,' for 'computers and communications.'

With all-digital systems, telephones are the critical links in a telematics-based population information dissemination network. Phones can be linked via wire, cable, microwaves, satellite, and other ways. It does not matter to the user.

There are over 565 million telephone terminals worldwide, and major efforts to expand this global network are well under way. The telephone instrument itself is undergoing rapid advancement. Phones with built-in microprocessors, visual display units, and memory devices are now available. Telephone and computing technologies together provide 'intelligent' communication terminals. Research-based population information can be delivered directly to policymakers using such technological pathways.

The trend to telematics is reflected in the fact that telephone companies and broadcast telecommunication companies are abandoning their traditional roles. They are (and must be) in the 'information business,' able to offer a full range of integrated products and services to access human needs and to move and manage information to help meet those needs. In fact, it is getting as hard to distinguish between an information product and an information service

... telecommunication and computing will be nearly fully merged by the late 1990s ... telephones are the critical links'

as it is between a telecommunications company such as AT&T, which now has a major stake in computers, and a computer company such as IBM, which now has a major stake in telecommunications.

As the distinctions continue to blur, industries will increasingly shift their focus away from developing 'products' and 'services,' and towards developing 'total solutions' to information needs.

New Digital Transmission Technologies

Photonics and lightwave technologies have themselves introduced an entirely new era. Photonics uses laser beams the diameter of a grain of salt. All the information in a 30-volume encyclopedia can be sent over a single strand of 'optical fiber' in one second.

Optical fiber is made of glass produced from one of the world's most abundant natural resources—sand. Bundled in packets, the hair-thin fibers can bend laser light around curves and carry it across entire oceans and continents. About 100 fibers make a 1 cm diameter cable. With 144 fibers, it is possible simultaneously to access over 300,000 channels of voice, data, and video.

Coaxial copper cables, in contrast, can carry 10,000 channels, and the common twisted-pair copper wires have only about 30 channels when carrying digital information. The first coaxial cable between Hawaii and California (installed in 1957) had only 51 voice circuits. The first trans-Pacific cable (installed in 1964) had fewer than 150 data and voice circuits. Today, five undersea cables serve Hawaii (Figure 3).

By the end of 1988, the \$600 million trans-Pacific undersea fiber-optic cable system, called

the Hawaii 4-TPC 3, should be in place. It will cross 2,900 nautical miles from California to Hawaii (carrying 40,000 calls simultaneously), then connect to another 1,200 miles of cable to link Japan with North America. AT&T will also link North America to Europe with the TAT-8 cable to encircle nearly three-fourths of the globe with a fiber girdle.

Satellite Technologies

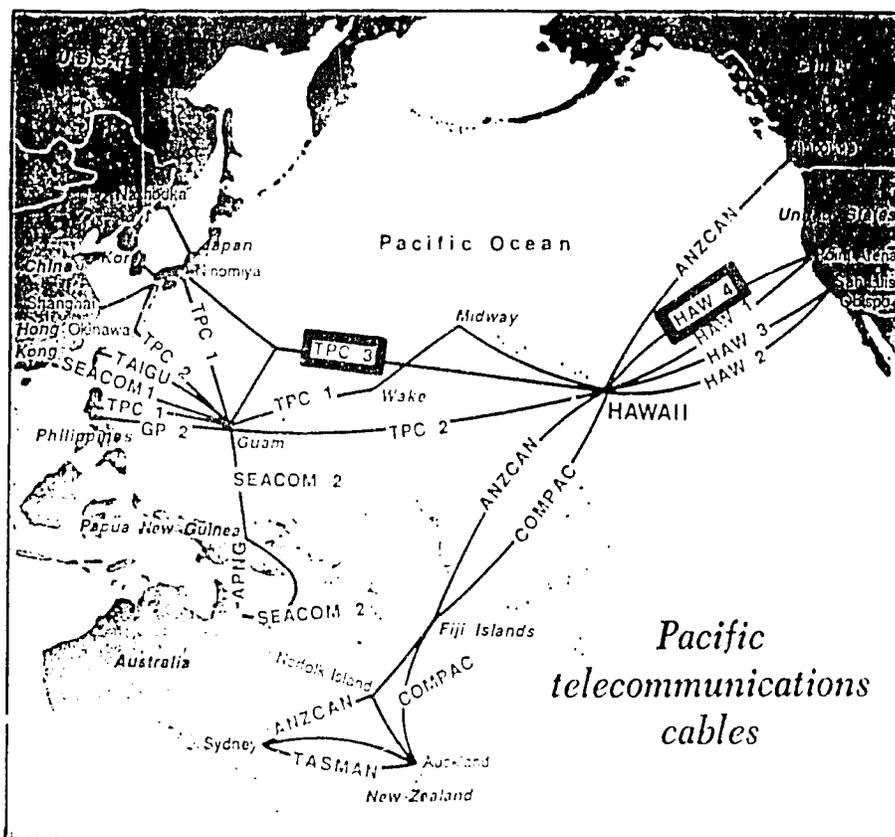
Will fiber replace the satellites that currently dominate Pacific telecommunications? No, but the balance between cable and satellite circuits in the Pacific will change to about 50:50 toward the middle 1990s. Global demand for satellites doubles about every three years.

Communication satellites will remain prime components in a worldwide network because they can inexpensively reach the remotest areas, including ships and islands in the middle of an ocean. Micronic (doing more with less) advancements in information technology continue to increase the capacities of satellite communication while reducing the cost.

The cost of a single satellite communication channel has dropped from US\$23,000 at the time of the Early Bird satellite (launched in 1969) to about US\$60 in the early 1980s. The INTELSAT series VI satellite has reduced the cost considerably more. Seventy percent of the traffic in the Pacific Basin is carried by INTEL-SAT, and Hawaii alone lies within the footprints of 22 satellites. That number will soon be 30.

Sharp increases in performance accompany the cost reductions. In the South Pacific, an ATS-1 satellite network provides remote services at a cost of US\$112.00 per hour (1981 figures). This is a highly cost-effective way to deliver population and other information to a very

Figure 3. Trans-Pacific telecommunication cables



Advertiser graphic by Greg Taylor

large territory, and satellite costs are dropping about 40 percent compounded annually.

VSATs

Though satellites now encircle the globe and can potentially reach almost any point on it, they are only half-way houses for information flows. Earth stations with dish antennas are still needed, to receive and send signals from and to the satellites. Micronic advances are producing Very Small Aperture Terminal (VSAT) antennas, typically 1.8 meters or less in diameter, at much lower costs than the giant dishes that heralded the dawn of satellite communications.

The potential for bringing the information age to remote parts of the PHC region is inversely proportional to the size and cost of VSATs. It

is worth noting, especially for a region rich in sunlight, that solar-powered VSATs are available. Though the capital cost of solar panels is relatively high, it should be weighed against the cost of providing conventional power generation facilities and transmission lines in remote areas.

PHC DEVELOPMENT IMPLICATIONS

In 1492, the Queen of Spain waited six months to learn of Columbus' discovery of the New World. Four centuries later, news of Abraham Lincoln's assassination took half that time to reach the British Government. But it took only 1.3 seconds for the world to receive a first-hand account of Neil Armstrong's landing on the moon.

Besides offering instant communication, the new technologies can positively restructure both industrial and agricultural societies in many other ways. Remote villages need no longer be isolated, and local communities anywhere can become viable social units with greater participation in their own destinies. The cinema, concerts, local news, agricultural prices and markets, teleshopping, and population and family planning information can be accessible to everyone. Urban centers no longer have the attraction of being the only emporia of current information. Rural-urban migration and its attendant pressures can be reduced, if there exists the capability to deliver information to where people live and to respond quickly to their needs.

As the power of technology grows, the capacity to aid development in the PHC grows apace. The new technologies provide new opportunities to solve many old problems, but the opportunities—and new potential problems—must be seen and understood before they can be acted upon.

The formation of a society, and therefore national development itself, is made possible because of the communication of information. It is only the level and kind of communication that distinguish humans from other animals, and modern societies from primitive ones.

Many international organizations have studied the role of both the conventional media and the new information technologies in national development. In general, studies report positive correlations between national communication infrastructure development and GNP, though the direction of causation is not always clear. Does

higher GNP predict more communication infrastructure, or vice versa (a 'chicken-or-egg' problem)? The relationship is probably mutual, but the key finding is that there is a positive relationship. At the macro-level, telephone density has been a particularly good predictor of development.

It helps to think about the benefits to national development in terms of 'societal intelligence.' A communication network is like the human nervous system: the networks are the neural fabric of society. We know from neurophysiological research that 'intelligence' has less to do with brain size and more to do with the capacity to 'connect' in self-actualizing ways.

H.G. Wells' dream of a 'World Brain' is now close to becoming reality. But the World Brain, and the World System containing it, cannot fully self-actualize without the capacity to self-monitor, self-communicate, and build self-intelligence. That is what a telematically-based information system for the PHC can do. It can build regional intelligence, the precursor to smart population policy decisions.

Population Information Systems

What does this mean for future research and population information systems development, project and program evaluation, and the training of personnel? What concrete recommendations can be made that will improve the delivery of population information to policymakers in the PHC?

'The new technologies provide opportunities to solve many old problems, but the opportunities must be seen and understood before they can be acted upon.'

Perhaps the most important implication is that the conventional media—particularly print media like the Census Forum—are relatively weak and less cost-effective for information storage, search, and retrieval purposes, when compared with the new technologies.

This conclusion may be unwelcome to people who have developed emotional attachments to conventional print media, which were themselves once perceived as being on the cutting edge of the communication technologies and were resisted. From any electronic information storage medium, however, a user can print a hard copy at will. With the emergence of desktop publishing, the user's on-demand copy will look and feel as it might if it came from a commercial print shop. Major national and international newspapers are now generated electronically in full color and then digitally transmitted to local locations to create hard copies for local distribution—and the policymaker or other reader does not even know it.

The current method of selecting and sending only one percent of the available information to a reader via a fixed and

limited print format is being supplanted by systems allowing end-users to select information from all of the available sources and otherwise customize their hard copy edition of (say) the Forum. There would be as many issue numbers for the Forum as there are end-users—a remarkable demassification of print media.

Information Overload

Researchers today use technology that saves time, so they produce more research. This

makes life harder for publishers and information clearinghouses, which have to select from a greater number of submissions (Acker and Calabrese 1987).

But might not a database vendor's or publishers' output be increased proportionately? Desktop publishing has almost certainly led to an increase in the number of publishers, many of whom publish a very narrow range of titles compared to established information suppliers and scholarly presses, and for narrower audiences. The new small vendors or publishers may therefore be taking up the slack of excess documents or manuscripts that the established sources cannot or will not handle.

If this is so, it puts the pressure for selection mainly on the user, not the vendor or publisher. All of us are increasingly bombarded with specialized publications, but for the busy policymaker with probably less time to spare

for reading, it is that much worse. If we cannot possibly read, or even scan, them all, what chance the policymaker? With mushrooming satellite channels and growing availability of transcending equipment, will not things get even worse?

'Researchers use technology that saves time, so they produce more research. New small publishers publish the excess of research-based papers. This puts the pressure for selection of material mainly on the user, not the vendor or publisher.'

One advantage of electronic newspapers and newsletters is that the computer can do the selection and scanning for the reader, and pick out only those publications and items within them that are of interest (most commercial information services—DIALOG, Dow Jones News Retrieval, and others—offer scanning services, for a fee). Therefore, the technology largely responsible for information overload may also be a partial solution to it.

A drawback for policymakers in less-developed countries is that they get the paper overload

produced on computers in the more-developed world, but do not have the computers to bring them the material online and filter it for them electronically. This situation doubtless will change in time. Nevertheless, even when they have the computers, policymakers may find the cost of using them to access global information services too high. The online charges and telecommunications costs of such services may increasingly widen the gap between information-rich and information-poor, both within and between nations. With luck, and perhaps a little philanthropy, economies of scale brought about by growing usage (brought about in turn by cheaper equipment and more diverse offerings) will encourage the services to reduce their rates.

The Velocity of Scholarship

The phrase 'velocity of scholarship' was used by Acker and Calabrese (1987) to argue essentially that journals are losing readers because researchers are producing more papers in electronic form. Fellow researchers can access such papers via electronic mail and networks such as BITNET long before the work gets published in conventional media. That may be no bad thing (except from the conventional media's perspective, of course). If the same were true for policymakers—if they had faster means for accessing more information—then their reading time-slots might be more productively spent than in wading through mountains of paper. Timeliness is an old bone

'The technology largely responsible for information overload may also be a partial solution to it.'

of contention between academics, who are slow to publish findings, and policymakers, who often need results quickly. The

new information technologies can bridge that particular – and important – gap.

CONCLUSIONS

New information technologies can promote the effective and efficient dissemination of population information to policymakers, both within and between nations. They can make a positive contribution to population decision-making, provided that the development and selection of the technologies are driven by a user's or nation's development needs and the technologies are properly applied.

If, on the other hand, the capabilities of the technologies are allowed to determine exclusively the problems to be attended to, decide whose needs are to be met, or widen the gaps between the already information-rich and information-poor, then their positive potential will not be fully realized.

At present, information systems development in general is too often driven by technology or vendor 'push' than by the understanding of and response to user needs. This must be brought into balance.

'New information technologies can promote the effective and efficient dissemination of population information to policymakers . . .'

The Need for Training

Policymakers and other decision-makers urgently need awareness and understanding of the value and role of the new technologies in the effective and efficient delivery of population information. Many recognize the importance of conventional media, especially print media like the Census Forum, but lack awareness of the

power, capabilities, and limitations of the new information technologies.

A Modest First Step

Our major conclusion and recommendation is that the East-West Center, in collaboration with USAID and others, establish a prototype interactive 'International Computerized Information Service for Population Information' (ICISPI), and that as a first concrete step toward this end an international expert meeting specifically addressing the relevant transnational network design issues, principles, and requirements be convened.

The ICISPI network should interconnect with and complement related networks, and have the potential to interface with them as required. Free and open access should be available to any responsible person or organization worldwide.

The network's outputs should be available both online (a long-distance dial-up system requiring a computer terminal) and on CD-ROM. Each method has its advantages and disadvantages to particular user groups. The idea is to provide the user with choices. Also built into the network should be an electronic mail (E-mail) or voice mail (V-mail) capability so that the network may be used for asynchronous, interactive, people-to-people communication.

The new information technologies are significantly different from print and other conventional media in their degree and kind of user impact, and provide a new set of more cost-effective and higher-impact alternatives for the dissemination and use of population information in the PHC.

The field of population communication and population information systems planning and development are on the brink of 'discovering' an array of very powerful new tools. Such tools are now available, but many users have yet to try them out. When they do, we can expect to see greatly increased attention to the new information technologies for purposes of information dissemination and use among policymakers in the 1990s.

Before that occurs, however, it is important that users receive guidelines on how to use the potential of the new technologies appropriately and fully. Inappropriate or uninformed use of that potential can only hinder the further development and beneficial application of the new communication technologies. □

'Many recognize the importance of conventional media, especially print media, but lack awareness of the power, capabilities, and limitations of the new information technologies.'

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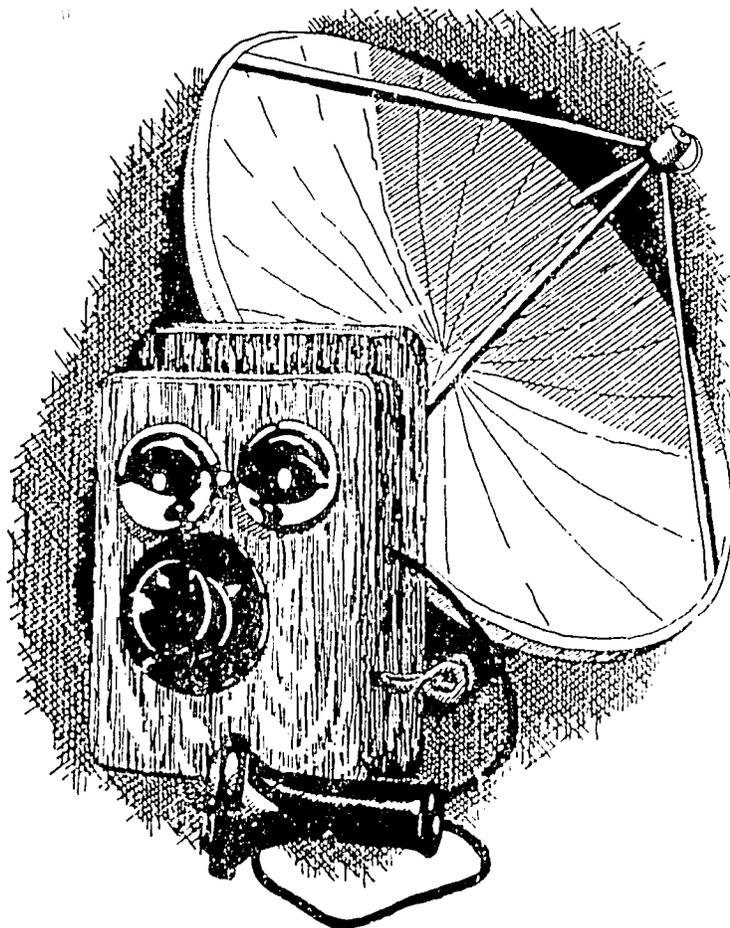
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