

Closing the Technology Gap: What Can the Non-residents Do?

by Nazrul Islam

The main advantage that non-residents have is their physical proximity to technological frontier. It is this proximity and access that they will have to use to identify such technologies that hold most prospects in closing the dual technology gap of Bangladesh.

WHEN the British came to Bengal in the seventeenth century, having chartered the British East India Company, there was not much of a technological gap between England and Bengal. In fact, in many sectors, technology used by producers in Bengal was superior to that used by similar producers in England. This was certainly true for textile. Maslin, the sophisticated product of Bengal's textile industry, was one of the main attractions that lured the British to dare their lives across vast seas and oceans and come to Bengal. Hence, Bengal did not suffer from any general technological backwardness vis-à-vis England when these two economies first encountered each other.

However, the British certainly had the political advantage. With Cromwell's victory, by the middle of the seventeenth century, Britain already had its version of bourgeois revolution. Bengal, on the other hand, even in the eighteenth century, was lumbering as a far flung, remote province of the Mughal empire, which by then has entered into the centrifugal stage of feudal dynamic after crossing its earlier centripetal stage. The British used this political advantage to establish their political rule. They then used this political power to conduct a ruthless extraction of economic surplus, to destroy the region's booming handloom textile industry, and to forcibly (no free trade there) convert Bengal from a producer of manufacturing articles into a supplier of raw materials and a captive market for England's produce.

It is this process of 'economic drain,' 'de-industrialization,' and 'conversion of Bengal's economy into an appendage of British economy that gave England the necessary capital, raw materials, and market to bring about the industrial revolution. And, it is no coincidence that industrial revolution started with textile industry! With industrial revolution, England's general technology level reached the industrial stage, while that of Bengal remained in the pre-industrial stage, and, in some respects, further regressed. The technology-gap was created!

Thus, industrial revolution and colonial domination were two poles of the same global process of rise and establishment of capitalism. In the countries of colonial power, it took the form of 'industrial capitalism,' while in the colonies themselves, capitalism took the form of 'colonial capitalism.' One of the durable features of the colonial capitalism turned out to be 'technological dualism' or 'dualism' in general. Colonial powers, in their own interest, tried to create some physical and social infrastructure and even some industrial enterprises in the colonies. Instead of being a natural growth of home-environment, these now came as alien imposition from outside.

These outposts of 'modernity' did not blend well with the general pre-industrial background. An uneasy and conflicting co-existence of 'modern' and 'traditional' sectors or of 'industrial' and 'pre-industrial' technologies became a permanent feature of colonial capitalist countries even after these became politically inde-

pendent. The situation was further aggravated by 'delayed demographic transition,' which emerged as another important feature of colonial capitalism. As a consequence, factor proportion of the colonial capitalist countries became sharply different from that of the industrial capitalist countries. This, in turn, made the contrast between 'modern' and 'traditional' sectors and between 'industrial' and 'pre-industrial' technologies even starker.

Thus, corresponding to the external technology gap between Bangladesh and the developed countries, there is an internal technology gap within Bangladesh. It is the gap between the technologies of the urban enclaves and the rural canvas, between the technologies of the modern and traditional sectors, between the technologies used by the elite and the masses. This dual nature of technology gap makes closing technology gap a difficult task. The task consists of bringing Bangladesh closer to the international technological frontier while at the same time overcoming the technological dualism within the country. This task is not served well by such investments and technologies that upgrade the technology of the modern sector but aggravate the internal technology gap. Can non-residents play a role in accomplishing the difficult task of closing the two technology gaps simultaneously?

Two Aspects of Technological Gap

Vicious Cycle of Backwardness: Technological gap that characterizes countries like Bangladesh has two aspects. One is its obvious disadvantage. This is best expressed by the 'vicious cycle of backwardness' that may be schematically put as follows:

EMBED Equation.3: Background technology results in low productivity, and low productivity implies low income. Low income, in turn, leads to low investment, but without investment technology cannot improve. Hence technology remains backward, and we are back to from where we started. This chain of causality is sometimes also formulated and referred to as the 'vicious cycle of poverty.' This is well known and does not need much explanation. However, technological backwardness has yet another aspect, which is also important.

Advantage of Backwardness: Alexander Gerschenkron, the late Harvard historian, coined the term 'advantages of backwardness' to express this second aspect of technological backwardness. This draws attention to the fact that the technologically backward countries do not have to 'invent anew' the technologies that are already available in the developed economies. They can just procure, imitate, or adapt these technologies. However, procurement, imitation, and adaptation are always easier, cheaper, and faster than invention. Thus, the technologically backward economies are spared from the costs and long time that the developed countries needed to invent these technologies. To take an example, the developed countries needed long time to invent and perfect computer technology. But, Bangladesh does not have to

reinvent computers. She can just directly procure these computers from the developed countries.

Furthermore, there is also the possibility of technological leap-frogging. Technologically backward countries can skip certain intermediate stages and directly proceed to the frontier technology. For example, many people in villages and cities of Bangladesh are directly arriving at the stage of cellular phone without having to cross the stage of wire-connected telephones. Yet the developed countries had to go through a long period of wired telephones.

Thus, there are certain 'advantages of backwardness,' and backward countries can use these advantages to industrialize faster. International experience has shown that this is not just an abstract possibility. The experience of the newly industrializing countries (NIC) like Taiwan and Korea has shown that it is indeed possible to take advantage of the technology gap and industrialize faster. Whereas early industrializing countries (EIC) like England and France took centuries to industrialize, NICs like Taiwan and South Korea could achieve similar technological progress in just a few decades.

Thus, the notions of both 'vicious cycle of backwardness' and 'advantage of backwardness' have certain validity. Political independence has opened both these possibilities (and their various degrees of combination) for the countries of colonial capitalism. The question is which of these two tendencies will prove predominant in the post-independence transformation of these countries. Will Bangladesh remain stuck to a 'vicious cycle of backwardness,' or will she take the 'advantage of backwardness' and catch-up with the advanced industrial countries? Obviously, Bangladesh wants to do the second. The question is how she can do that, and how the non-resident Bangladeshis can help her in doing that.

Investment: Vehicle of New Technology

Clearly, introduction of new technology requires new investment. However, not all investment denotes technological progress. If investment is conducted using old technology, then there is quantitative increase in capital but no technological progress. It is in the context of this distinction between investment as usual and investment associated with path breaking technological innovations that non-resident Bangladeshis can play an important role. Investment can be classified from many different viewpoints. From one point of view, investments may be classified into the following two types: Investment in physical capital; Investment in human capital.

Investment in physical capital takes the form of augmentation of tangible physical assets. On the other hand, investment in human capital takes the form of education, training, etc.

Human capital, therefore, is intangible and is embodied in individuals themselves and is not transferable. These two types of investment are complementary to each other. Presence of educated and trained manpower makes it possible to undertake physical investment involving sophisticated technology. At the same time, introduction of new equipment and technology helps to build up human capital through training and experience (learning by doing, as the economists call it). Thus, both these types of investment are necessary for technological progress.

What are the general conditions that are necessary to bring about the optimum volume of investment and ensure its desirable mix? Obviously, these conditions include good political leadership, honest and efficient administration, appropriate legal system, law and order, enforcement of contracts, work ethics and morality, healthy social and physical environment. The role of non-residents can, therefore, be searched in three areas, namely i) augmentation of physical capital, ii) augmentation of human capital, and iii) promotion of the general conditions conducive to investment.

Role of Non-Residents: The International Experience

It should not come as a surprise in this era of globalization that non-residents are indeed playing important role in development of many countries. The most spectacular example in this regard is China. It is well known that China's recent impressive growth is primarily fueled by investment of overseas Chinese. In 1997, the total foreign investment in China amounted to about 24 billion dollars. Of this, about 20 billion was investment by overseas Chinese. Most of this investment is associated with introduction of new technology. It is clear that even after integration of Hong Kong, overseas Chinese investment remains a crucial factor for Chinese growth.

Closer to home, there is the increasing role of non-resident Indians (NRI) in the growth and development of India. This becomes particularly evident by looking at the individual state level data. It precisely states having large number of NRIs, like Kerala, Punjab, and Gujarat, which have gone further in development compared with rest of the Indian states.

An extreme example of role of non-residents in their country's development is, of course, Israel. Israel's growth and development have always depended largely on the support of the Israelis and Jews living overseas. Recent experience of many Latin American countries also illustrates the significant role that non-residents can play. There is, therefore, no reason why non-resident Bangladeshis should not be able to play a significant positive role in promoting investment

and technology in their country.

Role of Private Transfers in Bangladesh's Economy

From one point of view, Bangladeshis working abroad are already making significant contribution to Bangladesh's development. This is evident from the importance of private transfer in national savings of Bangladesh. In 1996 private transfer to Bangladesh amounted to \$1,445 million. This is almost equal to the total foreign aid disbursement to Bangladesh in that year (\$1,450 million). Money from these private transfers finances a major part of Bangladesh's import bill and sustains domestic investment. Without this steady stream of private transfers, Bangladesh hardly could have achieved the modest growth that she has had over the past years.

However, most of the private transfers above were earnings by Bangladeshis working overseas on a non-resident basis, and these earnings were sent home in the form of remittances. Remittance earnings, in general, increase the volume of national savings and investment but cannot directly influence the technology of investment, which is determined largely by the average conditions prevailing in the country. Accordingly, the technological composition of investments financed by remittance earnings does not differ significantly from that of investment financed by domestic savings.

Also, bulk of the remittance earnings come from Bangladeshis working in the Middle Eastern and East Asian countries. Despite their significant recent progress, these are still not the technologically frontier countries. However, the role of savings transferred by Bangladeshis residing in the frontier countries is growing over time. They, in particular, can go beyond just increasing the volume of Bangladeshis' investment and influence the technological composition of investment too. By doing so, they can help Bangladesh catch up technologically. This means that, first, instead of remittances, their transfers have to be in the form of direct investments. Second, the technology content of their investments has to be such that it helps close Bangladesh's both external and internal technology gaps. The question is, are there such 'miracle' technologies? Can non-residents play the distinctive role of introducing these technologies to Bangladesh?

Searching for Prospective Technologies

The main advantage that non-residents have is their physical proximity to technological frontier. It is this proximity and access that they will have to use to identify such technologies that hold most prospects in closing the dual technology gap of Bangladesh. Detailing out this search plan should better be left to the non-resident technologists. However, in order to make the point, some speculation about the possible directions of this search may not be quite out of the order here.

One of these will involve new product development. An example may help illustrate the point. In recent years, because of environmental concerns, attention is getting back to natural fibers. Jute is an important candidate in this regard. However, plain, simple jute will not meet the requirements of the current age of high-technology. What is needed is development of jute-composites. Non-residents who are involved in this area of research can vigorously explore this possibility and try to come out with commercially viable products, which can then lead to a stream of investment. The beneficial effect of this line of development will directly extend to the jute growers of Bangladesh villages. There are many other similar possibilities of product development.

A second opportunity lies in the area of organic agriculture. In a sense, this can be an example of technological leap-frogging. The advanced countries are moving towards organic agriculture, are moving towards organic agriculture. They are doing so after passing through a long phase of agricultural development that was heavily dependent on use of inorganic, chemical fertilizers and pesticides. So, this is a return to post-industrial organic agriculture after crossing the industrial, inorganic phase. Bangladesh, on the other hand, has only recently started to switch from pre-industrial organic agriculture to inorganic agriculture. In the light of the experience of the developed countries, Bangladesh can take the advantage of directly switching from pre-industrial to post-industrial organic agriculture without having to cross through the long inorganic stage and endure all its negative environmental consequences. This leap, however, requires introduction of a new set of technologies and associated investments. Non-residents can play an important role in facilitating this switch. Note that these technologies will reach directly to the villages of Bangladesh and therefore have significant potential for mitigating the internal technology gap.

A third example of prospective technology is in the area of energy and power. Advanced countries are gradually moving away from non-renewable, carbon-based sources of power and proceeding toward natural, renewable sources of energy, like solar and wind power. This seems to be a highly prospective area for Bangladesh. Development of cost-effective solar cells or solar panel will be a major breakthrough for the power needs of Bangladesh households and businesses. The same may be said of power-generating wind-mills. One could think of innovative utilization of water-current as well. It is now increasingly realized that putting dams over rivers for electricity generation is not the best use of rivers as natural resource. In fact, the US has already entered the phase of bringing down the dams that are now in place. A proposal to bring out the mammoth Hoover dam is also under active consideration. For most of its rivers, Bangladesh simply does not even have the physical terrain to create the kind of elevation-differential that is necessary for operation of large-scale generators. So, Bangladesh has to think of very small scale, but numerous, power generators that can work on the basis of natural force of the river current. Such small scale solar, wind, and river-current based generation can directly reach the rural masses and help overcome the internal dualism while at the same time bringing Bangladesh closer to the twenty-first century. There are similar technologi-

cal opportunities in the area of transportation. Hydrogen-fueled based vehicles have already been invented. These emissionless and renewable-energy based vehicles are certainly going to be the mode of transportation of the future. Even conventional energy-based electric motor vehicle can be an important technology to explore. The fact that these alternative technology-based vehicles yet cannot travel long distances is not a major problem, because distances traversed in Bangladesh are generally small.

With regard to product development, an important area is that of construction materials suitable for the rainfall, moisture, sun, and flood conditions of Bangladesh. This pertains to construction of both residential structures and roads and highways. Of special significance are materials that can help alluvial soil to coagulate and harden naturally along river banks and road sides. This may help save Bangladesh in a large way from regular problems of river erosion and road damage. Innovations in the area of river dredging are of enormous importance for Bangladesh.

Finally there is the obvious area of computer software development in which the non-residents can play a pioneering role. Development of India's silicon valley in Bangalore area owes much to the non-resident Indians living in the US. There is no reason why non-resident Bangladeshis should not be able to play a similar role in development of software industry in Bangladesh.

The above by no means exhaust the list of possible directions in which the search for prospective technologies can proceed. The technologists, engineers, people of the business world will certainly know better. They have to enlarge this list and lead the search.

Once the technologies are identified, it will be necessary

to attract investment to these technologies and their introduction to Bangladesh. It is understood that investments that non-residents can undertake will generally be of small scale. These will not be large projects of the type financed by the World Bank or the Asian Development Bank. Hence, the technologies under consideration will have to match this small scale of investment. However, even in the advanced economies, the tendency now is more toward smaller sized industrial and commercial enterprises and away from creation of behemoths. Hence, the smallness of investment scale and technology will correspond well with the post-industrial tendencies of production organization. This may indeed be another example of leap frogging. This smallness is actually necessary and suitable for overcoming Bangladesh's internal technological dualism, because it will allow these technologies and investment to be widespread in the country, including the rural areas, instead of being confined to urban enclaves. So, as David Schau-macher so ardently argued, small may indeed turn out to be beautiful.

Closing the Gap through Human Capital Development

Apart from investment in physical capital, the other line of effort to close technology gap is to promote human capital development. Non-residents can play an important role in that regard too. A large number of non-residents are students, researchers, teachers, doctors, engineers, and other professionals. Each of these categories can play their own distinctive positive role in human capital development of Bangladesh. The researchers can think of setting up exten-

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sions of their laboratories in their respective counterpart organizations in Bangladesh. Revolution in the field of communications has made it very easy to coordinate and participate in research conducted in locations that are physically far apart. Doctors can think of collaborating with the hospitals and clinics in Bangladesh. They can set up their own clinics and hospitals. Educators can help build up new educational institutions and help further develop the existing ones. They can also think of joint research programmes, arrange and participate in exchange programmes of students and scholars. They can help in the development of curriculum and enrich the libraries and laboratories. They can even contribute to teaching in Bangladesh educational institutions, as and when possible. The students can help their counterparts in Bangladesh understand the value of time of an academic year. Human capital development will allow Bangladesh absorb new technology and close the gap faster.

Some of the activities above may even be of commercial nature. There is no harm if some can earn profit while at the same time developing Bangladesh's human capital. However, many of these activities will have to be of philanthropic nature. Many of the non-resident professionals obtained their education, at least in part, from government financed institutions of Bangladesh. Thus, they owe a debt to the country. They can view their contribution to Bangladesh development as a way of paying back that debt.

Non-residents and the General Conditions

But, what about the general conditions necessary for investment? Can non-residents contribute to the establishment of good political leadership, efficient and honest administra-

tion, dependable judicial system, law and order, healthy social and physical environment, etc.? Living abroad, it is probably difficult to do so. However, some residents are vigorously trying to do something of that sort. They have formed branches of various Bangladeshi political parties and are keeping active relations with the parent organizations. Some of them have gone back to compete in parliamentary elections; some reportedly aspire to become ministers. The parent parties also seem to put considerable weight on their overseas extensions. This is exemplified by co-optation of many non-residents in decision making bodies of these parties in Bangladesh and also by frequent visits of high level party officials.

Certainly, there is no harm in non-residents trying to directly influence politics in Bangladesh. However, this is probably limited to a small minority. The vast majority of the non-residents do not seem to have much appetite for direct Bangladeshi party politics. Does that mean that they have no role in influencing the general conditions? Actually, as it turns out, there is some, though, I guess not a very direct one. This role is through the feedback effect of capital accumulation on the general conditions. While the general conditions directly influence the quantity and quality of investment, a reverse effect works too. Rising level of human and physical capital exert a positive influence on the general conditions. Hence, the more non-residents can increase their physical and human capital investments, the more they can hope to positively influence the general conditions through the feedback effect. This may be a slow and roundabout route, but in the long run, influence along this route may prove to be more durable and encompassing.

Conclusions

Overall, therefore, non-residents can play an important role in closing Bangladesh's technological gap. It is a difficult task, because it requires simultaneous closure of two technology gaps, external and internal. The challenge is to overcome the external technological gap without exacerbating the internal one. However, there are technological niches that non-residents can exploit to accomplish this task. The establishment of the web-site 'www.techbangla.org' is a good step in that direction. This site will help to pool efforts in the search for innovative technological ideas and to bring technologists and investors together.

In recent years, another gap is developing between Bangladesh and the advanced countries. This is regarding environment and the environmental gap. Bangladesh, though poor, used to be a country with clean air and clean environment. But in recent years, environmental degradation has proceeded faster than industrialization. According to UN reports, Bangladesh has achieved the ignominious distinction of having the highest level of lead in air and arsenic in water. This is tragic, and it should be stopped. The technology gap has to be closed without creating a new, environment gap. The non-residents have taken the initiative to set up a Bangladesh Environment Network, and through the web-site HYPER-LINK 'http://www.makelist.com/list/bangladeshev' they are trying to combine residents' and non-residents' efforts in combating this new menace.

The country has certain expectations of its non-residents. Helping Bangladesh to close the technology gap will require creativity, initiative, and effort. It may require some amount of sacrifice too. But, if that is the call of their country, the non-residents cannot refuse. Can they?

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Alarm Grows over Privacy Threat from Cyber Snoops

The onset of the information age has made it possible for all sorts of organisations to nose into one's personal details, to file them away and pass them on to others. Efforts are being made to curb databank abuse, reports Gemini News Service, but the global nature of the Internet presents a huge obstacle.

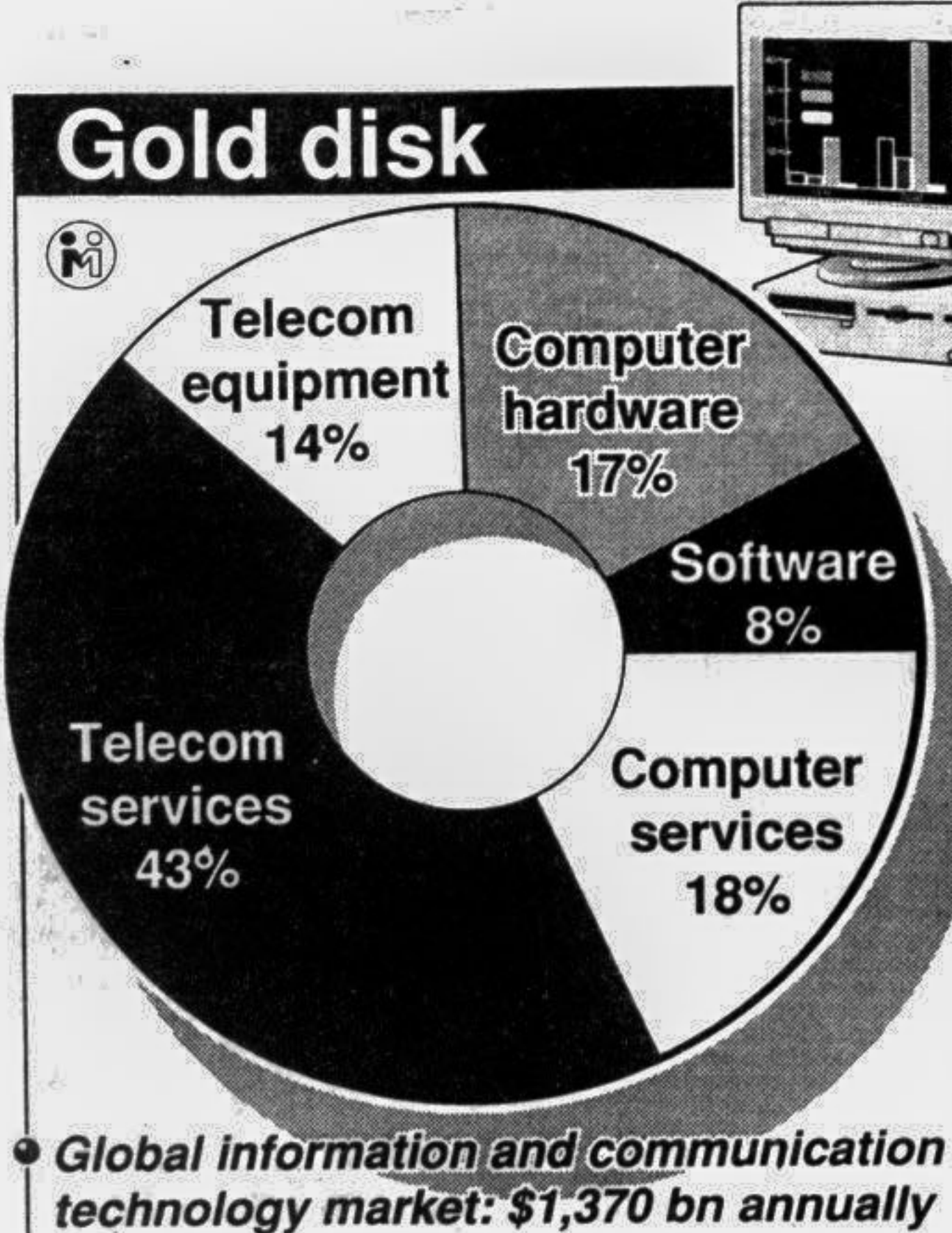
THE explosive growth of databanks on the Internet has led to a new twist in the old clash between the public's right to know and the individual's right to privacy.

With information ranging from the price of your home to the number of malpractice judgments against the family doctor readily available online, people in highly computerised countries such as the United States are becoming increasingly anxious about the extent to which their private lives are circulating in cyberspace.

"In the past year, there has been growing public concern about computerised databases that collect and disseminate personal identifying information about consumers," notes the US Federal Trade Commission in a report to Congress about online services that offer personal dossiers.

The report was compiled at the request of three US senators investigating the boom in Internet sites that can locate, identify or verify the identity of people. These operations are touted as individual-reference services or look-up services. "A vast amount of information about consumers is available through individual-reference services," says the commission's report, available on its website: <http://www.ftc.gov>. "[This] ranges from purely identifying information, e.g., name and phone number, to much more extensive data, e.g., driving records, criminal and civil court records, property records and licensing records." While many of these details have always been part of the public domain, the new technology has transformed retrieval from a cumbersome search to a feat that can be achieved simply by plugging a home computer into the global computer network.

Arlene Getz writes from Boston, US



Some databanks also offer information from non-public sources, such as the credit bureaux that keep detailed financial histories of every US consumer. These credit histories have traditionally been available to organisations such as banks investigating a client's suitability for a loan. But easier online access now makes this information available to almost anyone who cares to look. In some cases, would-be car buyers have been shocked to

personal information is often used by consumers as a form of identification during telephone transactions such as banking, an unscrupulous person could use these intimate details to pose as someone else.

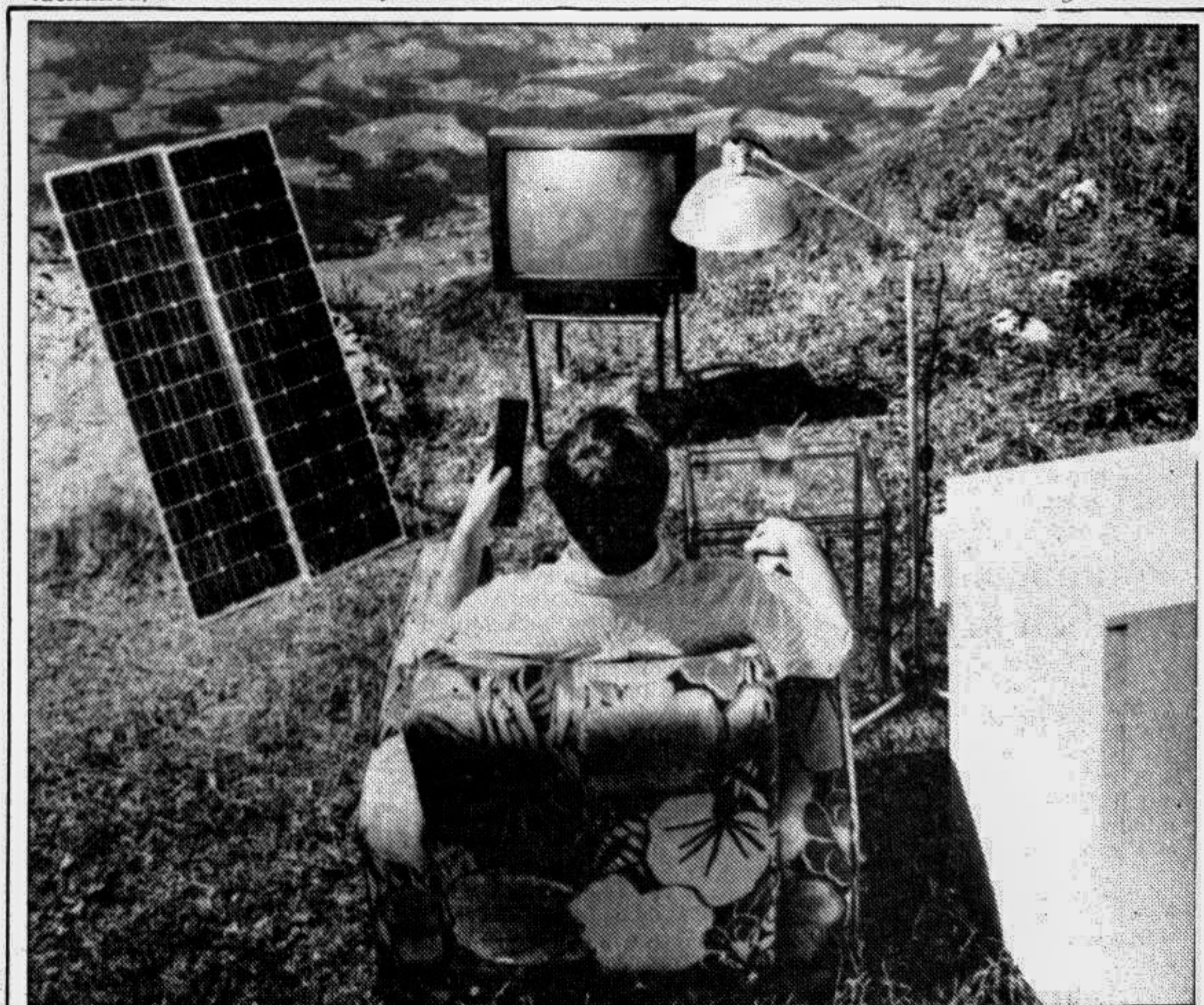
"The easy availability of this information could lead to increased incidence of identity theft," says the Federal Trade Commission report. "Many consumers are increasingly concerned that personal information is so widely available." Alongside these concerns, however, is the recognition that databases can provide positive help.

Look-up services can assist police hunting for criminals, and there have been several cases of people, who were adopted as children, using the Internet to track down lost relatives. Some states are also setting up their own databases to help residents make more informed choices about local services. Massachusetts, for example, recently unveiled a new website <<http://www.state.ma.us/reg>> to help consumers check up on the holders of the 530,000 or so professional licences issued by the state.

Information about groups — ranging from funeral directors and hairdressers to lawyers and doctors — is listed for those wishing to confirm that an individual has met the state's professional requirements. Officials say they launched the service to give consumers more power to scrutinise those they hire.

None the less, even websites such as this highlight the grey area between public and private information.

Although few professionals object to the publicising of their registration numbers or professional qualifications, most do not want their private home addresses made available to the global online community.



Solar energy: Environment-friendly German technology. The peculiarity with this German (Siemens) equipment is — while most customary photo-voltaic systems generate only DC, this installation produces AC for all standard TV sets, radio or refrigerators.

— IN Press