Incidental Paper

DATA COMMUNICATIONS AND INDUSTRIAL POLICY IN SOUTHEAST ASIA*

Morris H. Crawford

* A Summary of Interviews with Nine Government
and Industry Leaders in Malaysia, Singapore
and Indonesia

Program on Information Resources Policy

Harvard University

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DATA COMMUNICATIONS AND INDUSTRIAL POLICY IN SOUTHEAST ASIA -
A summary of Interviews with Nine Government and Industry Leaders in
Malaysia, Singapore and Indonesia
Morris H. Crawford
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PROGRAM ON INFORMATION RESOURCES POLICY

Harvard University   **Center for Information Policy Research**

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Preface

This memorandum is preliminary to a Program case study on the employment of information technology in the Third World. The completed study will assess the consequences for U.S. trade and investment from the growing usage of information technology in the industrialization of three Southeast Asian countries, Malaysia, Singapore and Indonesia.

Research for the complete study includes a large number of interviews with officials, businessmen and others in each of the three countries. This summary of nine of the interviews* contains material from individuals who are directly responsible for information technology in a developing country environment, and is intended to give our readers an early opportunity to assess the importance of emerging problems and issues as the use of computer-communication becomes more pervasive in the Third World.

I wish to express my appreciation to the nine persons whose views are summarized in this memorandum, and to the many others interviewed who will be included in the finished report.

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*Since they are interviews each person reviewed and approved comments attributed to him.

Introduction

Computer-communications is fast becoming an integral part of industrial progress in Southeast Asia and in Malaysia, Singapore, and Indonesia, use of these technologies is growing rapidly in many arms of commerce, finance, and government. Singapore is setting the pace. Many high quality data communication systems that are comparable to those in Europe, Japan, and North America are in daily use. Malaysia is only a short distance behind, and Indonesia is probably less than a decade away from widespread and functionally effective data communications.

What has brought about such remarkable advances in these countries? How are they managing the complex process of data communication development? What accounts for their success against "information imbalances" that seem so intractable in some other Third World countries? How are these Southeast Asian nations integrating information technology in industrialization policies? The following unevaluated summary of interviews with nine government and industry leaders of the three nations may help shed light on some of these questions.

Singapore Lives By Its Wits

Yeo Seng Teck is the Director and Cheong Wai Chew is a Senior Officer for Singapore's Economic Development Board. The Board's job is to draw up and implement an economic development strategy for the entire range of economic activity in the country. In this context, it is responsible for a strategy for developing and using computer-communication technologies.

Yeo and Cheong use no notes or charts in explaining development strategy, and Yeo spends as much time talking about the "why" as the "how" of EDB action. His office is in the World Trade Centre overlooking Singapore's main harbor, and his first thoughts are on trade and international competition.

Singapore's economy, Yeo says, is tied to the export of goods and services; it has to export $1.70 for every dollar of national production. If Singapore is slow in adopting the new technologies, it will fall behind and lose competitive position. The top public priority is investing in modern infrastructure needed for a high technology private sector. The coming decade, says Yeo, is dedicated to achieving a high tech economy, in which the work force will be predominantly employed in producing high value added services or manufactured goods for export.

In the telecommunication and computer fields, Yeo says, this means four things:

(1) Scientific, technical, and managerial expertise must be built up.

(2) Advanced telecommunication facilities must be installed to meet the needs of the business and financial houses.

(3) Investment incentives must be provided for expansion and innovation in computer hardware and software enterprise.

(4) Extensive employment of computer-communication technologies must be encouraged in all aspects of Singapore's economy.

Its compactness, Yeo admits, might make these tasks easier for Singapore than for larger neighbors to accomplish.

Singapore's priorities are focused much more on software and usage than on manufacturing of hardware. The Singapore Government, Yeo points out, is committed to a fully wired nation, with a digitized system that will make its economic community a part of the world economy. Many companies, he adds, are already linked on-line internationally, with high speed data communication systems in use daily.

Cheong supplies the details on Singapore's strategy. It is a complex mixture of actions and objectives that Cheong reduces to a few words,

> "Singapore's only resource is its people who must live by their wits."

He notes that Singapore is close to zero population growth. Increases in national production must come from higher productivity. The Economic Development Board sees computer applications as the principal channel for raising productivity. The chosen vehicle is the National Computer Board, set up in 1981 following an official inquiry into the human requirements for a high tech economy. The objective of the Economic Development Board is to expand the numbers and competence of the technical and managerial personnel needed in a regional center for computer services. By 1990 some 5,800-7,000 additional computer professionals are needed, a 5-6 fold increase in less than a decade.

These ambitious targets are to be achieved through both new and old institutions. The Computer Science Department of the University of Singapore is increasing its capacity so that it can turn out 200 graduates a year by 1985. The Institute of Systems Science, set up in 1981, is a joint effort of the National University and IBM and gives postgraduate training for up to 100

systems analysts each year. It also provides upgrading courses for computer professionals and conducts managerial seminars for senior corporate executives. The Japanese-Singapore Institute of Software Technology, established in 1981, trains up to 250 programmers and analysts each year. It also runs short courses for senior executives. The Centre for Computer Studies is to begin operation in 1983 for training 200 programmers a year at the semi-professional level.

Computer training has been made a part of public school instruction, so that youngsters will grow up seeing computers as a part of their daily lives. After all, Cheong says, "you have to operate a terminal even to work at "MacDonalds".

A parallel strategy of the Economic Development Board, Cheong says, is to encourage investment in hardware manufacturing and in software service companies. This is accomplished through a planning system that is "indicative" rather than "administrative" or "mandatory". The system employs incentives, not subsidies. Whether the Singapore Government participates in ventures or is sole owner, the ruling principle is to show a profit. Even a public service company like the Telecommunication Authority of Singapore is operated like a private company, with its own budget and a tradition of showing substantial net operating revenues.

The Economic Development Board, Cheong says, has offices throughout the world, including four in the U.S., and may actively seek certain foreign investors in fields of high priority. Their officers get together every 12 months to review the nation's status and to work out a strategy with specific targets. The Board officers then identify people and companies that may be useful in achieving these development targets. Various incentives are offered. New companies that come in may be tax exempt for as long as ten years. Investments in computers may be depreciated in a one year writeoff. Companies that do research and development may be eligible for funding from the R&D Block Grant. Foreign companies may qualify for these grants when jointly conducted R&D has an element of technology transfer to the Singapore partner.

CAD-CAM Comes to Singapore

One of the Economic Development Board's eye-catching ventures is a program to bring CAD-CAM (Computer Assisted Design-Computer Assisted Manufacturing) into Singapore. The CAD-CAM Training Unit is a key part of this program. It is a part of the formal structure of the Economic Development Board and is jointly operated with the Computervision Corporation of the United States.

Michael Flanagan is a Co-Chairman with Mark Lam of the Economic Development Board of the CAD-CAM Training Unit. An employee of Computervision, Flanagan was seconded to Singapore for one year, arriving in November 1982. Three Singaporean lieutenants have been trained in the Computervision headquarters in Massachusetts and will take over entirely when Flanagan leaves.

The Training Unit is located in the Town Hall of the Jurong Industrial Estate about 10 kilometers from downtown Singapore. Nearby are other computer training units, such as the Japan-Singapore Center for Software Training, the National University, and the Institute of Systems Science. The Robotics Training Unit and the Singapore Science Park will also be located in this area.

Site preparations were not finished when Flanagan arrived and he spent two months installing the CAD-CAM instructional system. Designed by Computervision, the system configuration includes a 32 bit Computervision Analytic Processing Unit, two Computervision Designer 200X processing units, two disk and two tape drive units, eleven mono-chrome and four color workstations, and two plotters, a paper punch tape, and a paper punch reader.

Momentum was lost by the delay in preparation, but uncertainties vanished soon after the first course began. The full year's program features two basic courses, a four week introduction to Mechanical Design and Numerical Control, and a three week course on Printed Circuits and Electrical Schematics Design. Later in the year, a third five week course will be added on Advanced Mechanical Design and Numerical Control. Flanagan's schedule allows for shutting down formal course work occasionally to permit time for practical experience on the equipment. This has been a popular part of the work of the Training Unit, with most of the class members becoming absorbed in the CAD-CAM techniques and staying on long after closing hours.

So far most students have come from the staffs of other training institutes, and have included people from all managerial levels. Participation will widen in coming months, and more than 100 students are expected to complete the basic courses during the first year. In June 1983 the Unit began a series of seminars for decision makers in industry, a course intended to familiarize the executives with the CAD-CAM system, thus encouraging use and acceptance of the techniques.

The CAD-CAM Training Unit has attracted a lot of attention, partly as a result of its enthusiastic participants, partly due to publicity about this unique undertaking, and partly because of public interest in anything related to computers. Visitors stream through the place, as was seen during the author's visit. Flanagan predicts a booming market for CAD-CAM as the graduates from the unit increase in numbers and begin to employ the techniques in their government and private sector offices. A respectable local market already exists, largely the result of initiatives of another American. Michael Adams heads a locally incorporated computer service firm, CAD-CAM Systems Pte., and several of his clients--eg. Phillips, Charter Tool Industries, the Housing Development Board, and Defense Architects--have sent participants to the training unit. As familiarity with CAD-CAM grows, its use could indeed grow substantially, and its applications may emerge as a major part of the Economic Development Board's "offshore factory for software development."

Entrepreneurial Initiative In Malaysia

Private initiative is as respected in Malaysia as in Singapore. John Chinn, the Managing Director of Komputer Sistems (M) Sdn. Bhd., is an experienced computer systems executive in

his mid-thirties. Thoughtful and articulate, he is well-informed on all aspects of his trade in Malaysia.

Chinn's company is located in the industrial suburb of Petaling Jaya, about 10 kilometers from Kuala Lumpur. Komputer Sistems is the Malaysian branch of a Singapore-based multinational, Computer Systems Advisors. Computer Systems Advisors has other branches in Australia, Hong Kong, and Indonesia and does business throughout East Asia. It sells packaged systems and designs and markets hardware and software systems to meet specialized needs. Computer Systems Advisors' integrated systems are based on Digital Equipment Corporation's mini-computers, with peripheral equipment drawn from a number of other producers. Its clientele includes banking, finance, petroleum, insurance, and sporting organizations.

In Malaysia, revenues of Komputer Sistems have grown rapidly in recent years. Most of their sales, Chinn says, are for turnkey systems. One system installed in Malaysia is that for the Overseas-Chinese Banking Corporation. It is an on-line system for current and savings accounts and links the bank's four branches in Kuala Lumpur by telephone lines. Another installation by Chinn's group is the betting system of the

Selangor Turf Club. "Telebet," which services 120 betting

terminals and enables club members to place bets by telephone on

races at the four tracks in Malaysia and Singapore, can handle as

many as 400 transactions a minute.

Malaysia's future in data communications looks bright to

Chinn. Although companies are cautious about installing

networks, demand is rising and he is getting more inquiries into

the feasibility of intercity linkages. It is necessary to use a

dedicated line for his purpose, since there is no public data

system. This is costly and makes sense only for the larger

companies. A dedicated line may also involve a wait of 6-9

months before it becomes available and the uncertainty of the

wait has deterred some potential users. But, Chinn says,

Malaysian Telecoms is reliable and you can count on getting the

line in time. The delay is the result of a system that is fully

utilized. Free lines are rarely available, but most companies

need the 6-9 months for planning and installing equipment anyway,

adds Chinn.

Malaysian Telecoms recently announced its decision to install

a public switched data network. The announcement has been warmly

welcomed by businessmen who have advocated a system for small

businesses. Chinn expects Telecoms to begin installing the
network within the next year and to introduce packet switching
soon after. He points out that Telecoms has been making
important line improvements in recent years, and has installed
high capacity land lines and microwave circuits for several
international links. Telecoms is well along in digitizing the
nation's telephone exchanges. The last of the older
electro-mechanical and crossbar systems will soon be replaced.
Chinn predicts that these trends will continue and possibly be
accelerated.

Chinn thinks that the line and switching improvements and
especially the national data network will stimulate Malaysian
business. Malysian authorities are banking on this, and expect
that investments in telecommunications will ultimately support
the nation's international competitiveness. Lifting the 35
percent taxes on imported computers two years ago, Chinn thinks,
was a shot in the arm for microcomputer sales. Another stimulus
has been the decision to permit computer investments to be
written off in a single year. These changes have made low-cost
microcomputers even more attractive to small businessmen. They
have sought them and have begun to employ them, using simple

accounting and budgeting packages. Further improvements in

telecommunication facilities, Chinn believes, could have a

compounding effect since they would lead to much greater interest

in country-wide usage of data communications.

To a question about the lagging of Malaysia behind Singapore,

Chinn referred to the geographical spread of the country compared

to Singapore's compactness. Facility and line costs are more

expensive relative to the number of users. Malaysia has huge

facility costs in providing service across the South China Sea to

Sabah and Sarawak. Local governments have to be consulted when

long-range communication systems are involved, and in Malaysia

this means taking state as well as city governments into account.

Inter-city rivalries often come up, too, especially when limited

funding makes it necessary to choose between service to competing

cities.

Malaysian policy can be misjudged, Chinn says, by those who

measure progress in terms of flashy programs. That isn't the

Malaysian style, he says. Malaysia opts for policies that will

show steady progress, and is conservative about how it goes about

moving in new directions. Chinn ticked off a number of policy

lines that he thought defined current communications strategy:

(1) The Prime Minister has appointed a Senior Officer in his own office to oversee the crucial manpower requirements for computerization and information technology.

(2) Budget allocations for graduate training abroad and in universities at home are substantial.

(3) Computer training is being introduced in the public schools.

(4) All of the Ministries have been instructed to computerize and have been given adequate budgets for the purpose.

(5) The Prime Minister goes out of his way to endorse computerization, and to stress its importance for Malaysia's economic future. It all adds up, Chinn says, to a solid, low-key approach that should pay off.

Do-It-Yourself Venture Capital

Peter Tan is a self-made Malaysian entrepreneur. In his early thirties, Tan established and now heads Dataware Sdn. Bhd. While very young, Tan went to work for the local Wang outlet. Three years ago he resigned as Wang's sales director to set up his own company.

"You have to do it yourself", Tan says. "You pledge your
house, you pledge whatever you've got. You sign over everything
you own". He is out of the woods now, in less than three years.
Tan hit an expanding market and, despite keen competition, his
company has thrived.

Dataware Sdn. is distributor for Victor Technology. Their
best sales are of microcomputers, mostly to small businessmen who
want standard packages. Tan explains that the cost of a
microcomputer is low, but the cost of customized software is
high. To keep the total cost down, most of his customers buy
only packaged budget or accounting software.

But, Tan says, his market is changing. This is partly a
matter of customers becoming familiar with their microcomputers.
Recognizing that they can get more from the computer than the
packaged systems permit, they are beginning to ask for more
complex software. Some of his larger customers are also
outgrowing their customized systems. Several are reaching the
limitations of the microcomputer and are asking Tan to design
more complex systems that will link their micros to larger
computers.

Tan is also finding increased interest in corporate-wide systems that connect branches in different locations. He is convinced that a public switched network will unleash a pent-up demand that will raise to even higher levels an already strong 18 percent annual growth rate in microcomputer sales.

Tan often uses graphic language to describe his trade. Malaysians, he says, are the "middle men who are putting things together in electronic assemblies". They are making money for Americans who "just sit back in their offices and push buttons".

"They don't know what they send", Tan says, "We sell. We do everything for them".

Singapore is moving away from this, Tan says, by starting to manufacture small computers. He is impressed by Singapore's efforts in supporting computer education, which he thinks will help establish a more independent position. He is particularly inclined toward the steps that Singapore is taking to make software a major industry.

Malaysia, on the other hand, has been moving more slowly. Most of the effort in Malaysia has been in the private companies. But he has seen some change in the recent past. The schools are beginning to teach computers. The universities are turning out

graduates with a major in computer science. And many of the people who have been educated abroad have returned and are putting more realism into computer instruction at the universities. Tax and duty cuts help, as does a data network. Yet the software industry in Malaysia is hurt by copyright laws that are weak. Why produce software that can easily be copied without recourse? Tan thinks that the lack of copyright protection is going to be a deterrent to the development of a software industry in Malaysia.

Decision Making at Telecoms

Muhammad Radzi is the Deputy Director General of Malaysian Telecoms. A man in his early forties, Radzi is an engineer who was educated in British and Scottish schools. He has a warm personality and is easy to talk to. He has the reputation of a competent administrator, a careful but fair decision maker, with a solid background in all facets of telecommunications.

Radzi explained the Malaysian decision to set up a public data network. The system was considered five years ago, he said. Telecoms decided not to go ahead at that time. The decision was based on two factors, (1) market surveys showed inadequate demand, and (2) international standards did not exist for such a network. Both situations are now changed. A recent market

feasibility study gives favorable results and indicates that usage will develop rapidly once the system is in operation. The second factor, Radzi says, is no less important for Telecoms, which "considers international standards of paramount importance." The agreement of the CCITT* on the X25 Standardized Protocol is critical for Malaysian Telecom's decision to have a public data system. Telecoms has announced that users must have equipment that meets X25 standards if they expect to interface with the Telecom system.

Radzi says that Telecoms has issued specifications and has called for bids on several portions of the public data system. He says that the system will function more as a carrier than a provider of services. It will have a packet switching service for whoever wants to use it. Leased circuits will continue to be available, and he expects that companies now using leased lines--Motorola, Texas Instruments, American Express, and National Semiconductor--will continue to use them.

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*CCITT = The Consultative Committee for International Telephone and Telegraph of the International Telecommunication Union.

Initially the data bases available on the network will be foreign. However, Radzi anticipates that Malaysia will be developing important data bases of its own for such products as palm oil, rubber, and tin. SWIFT, the international financial network for banking operations, has approached Telecoms about using the system. He foresees no problems and expects that SWIFT will be functioning in Kuala Lumpur as soon as it lines up enough banks to justify the service.

U.S. marketing of telecommunication products, Radzi says, has been meager because of the differences between U.S. and Malaysian standards. Malaysia Telecom's strictness in regard to international standards has made it necessary to reject U.S. bids on several occasions. Radzi believes that American manufacturers do not appreciate the importance that Malaysia gives to this matter. Once a standard has been approved in ITU, Telecoms accepts this as a national standard and does not lightly permit divergences. U.S. telecommunication products, he says, often follow unique standards that differ from ITU. This may happen, Radzi speculates, when U.S. manufacturers develop the first prototypes of new products and go into series production without waiting for ITU to act.

In these circumstances, buying from U.S. manufacturers would require Telecoms to modify equipment in order to interface with the Malaysian system. This would be costly and serve no useful purpose. To avoid this, Telecoms specifications are usually drawn up to allow bids that are in conformance with ITU standards. Another situation may arise when leased line users ask to employ equipment that has been produced according to standards other than ITU's. In such cases, Telecoms must run tests to ascertain the acceptability of the equipment, which is also expensive and a burden on Telecoms limited test and evaluation staff.

In answering a question about videotex, Radzi says that a policy has not yet been decided. This is a new service of great interest to Malaysia, and it is possible that videotex will be offered on the public data network. The U.K. has offered to make Prestel's system available for this purpose through its aid program. Interest in public videotex would be primarily as a public education supplement and as a means of disseminating practical information--on how to build a house or how to repair a car, for instance. Radzi pointed out that public schools in Malaysia have been on a half-day schedule for many years. A public videotex system might be a useful and relatively inexpensive way to extend the school day.

Although Malaysian policies on computer-communications may be expressed in low-key actions rather than bold strokes, Radzi says that the nation's commitment to advancement in all forms of the technology is real and comprehensive. Malaysia has no "master plan" for the "information age." Yet the policy line in the country is clear and consistent.

Policy direction is often conveyed in personal terms, rather than in grand schemes or showy new programs. Prime Minister Mahathir, Radzi says, has endorsed computer-communications as a high priority objective of the nation, both publicly and in smaller governmental meetings. He has instructed his cabinet to computerize their ministries and has taken the lead in a very personal way. Mahathir is an exceptional chief-of-state who has a computer terminal on his desk and knows how to use it. His son is a computer scientist and, Radzi says, Mahathir often takes an active role in decisions on technical subjects, such as last year's consideration of the new switching installations.

At this stage, Malaysia's number one objective is training of professionals, engineers, and technicians. Primary emphasis in this is given to universities and existing Telecoms facilities rather than to new training institutes. Extensive scholarship

and training programs have been in operation for several years,
providing for both internal and external education. Funds have
been substantial and have increased progressively over the years.

The go-ahead decision on a public data network, says Radzi,
is a clear indication of the importance of commercial data
networking in Malaysian policy. Tax reductions and import duty
cuts have been made to encourage investments and greater usage of
data communications and computerization. Upgrading of lines and
new installations of high capacity lines are being stepped up as
a part of a longer term effort to provide high grade commercial
service. Computerizing the telecommunication system in Malaysia
is itself a top priority of Telecoms.

Malaysia's interest in computer-communications is based on a
desire to employ the technologies throughout the nation's
economic structure. Applications, not hardware production, is
the objective. The government is looking for ways to further the
country's knowledge and awareness of what is going on in other
nations. What are the new and productive uses of the technology
and how can they be adapted to Malaysian needs and its resource
base are the principal question of Malaysian policy. For
answers, the nation welcomes the advice and experience of other

countries, in particular the United States. And, Radzi says with

emphasis, capital investments that will employ advanced

computer-communication technologies are also welcomed.

The Coconut Tree, Palapa, and the Computer

Indonesia has a much deeper computer-communications gap than

its neighbors. Its 6,044 inhabited islands are widely dispersed

and for many the most visible official presence is a magistrate's

table under a coconut tree. Yet the nation is joined together by

the Palapa communication satellite and a record system that

stores vital information in computers in Jakarta. The coconut

tree and the computer are symbols of a cultural gap that will not

be readily closed.

One Indonesian who hopes to close the gap is Adi Adiwoso, a

young business man in Jakarta. Adiwoso is the president of a

computer service company and a sophisticated critic of

Indonesia's policies and its prospects. He was educated in the

U.S., is earnest in manner, self-confident in style, and very

intelligent. Adiwoso graduated from Cal Tech in 1975, then spent

the next seven years with Hughes Aircraft designing communication

satellite and other space systems.

During Adiwoso's advance in the Hughes organization, he worked on various projects for Satellite Business Systems (SBS) as well as a number of other satellites. He was discontented, however, because he wanted to return to Indonesia. In 1982 he found financial backers, whose support enabled him to establish a computer service corporation, Pt. Realisasi Komputer Nusantara, in Jakarta.

RasiKomp Nusantara is founded on Adiwoso's technological judgment that the merger of computer and communications represents the wave of the future. Whoever fails to move with the merger, he says, and sticks with the one or the other will fail. Computer technology, he believes, must be increasingly employed in the merged technology mix, for these production costs are going down while non computerized communication costs are going up.

Adiwoso's biggest problem is in getting satisfactory technology transfer arrangements from foreign companies. Currently, RasiKomp Nusantara is using the products and software of a French concern, Realization d'Etudes Electroniques (REE). In some respects REE's technology may not be up to U.S. or Japanese standards, but this licensing agreement gives Adiwoso

more control and freer access to the technology. The learning

curve of his technical and professional staff, consequently, has

a steeper slope than if he were tied to licensing conditions that

are available from U.S. and Japanese companies.

Adiwoso is adamant on this point. He justifies his attitude

in terms of his professional background. As he fully understands

the principles behind the technology, he can judge with some

accuracy when something is lacking. He believes that somewhat

inferior technology that he has control over is better business

than superior technology that somebody else controls. Thus, he

is not willing to accept any affiliation unless it permits

maximum technology transfer for his company. He is confident

that, in time, his company's success will enable him to deal with

the Japanese and American firms on his own terms.

Business is brisk for RasiKomp Nusantara. His clients

include both small and large concerns and American multinationals

as well as Indonesian firms. Adiwoso has 35 persons working for

him, all but four of whom are technically trained. RasiKomp

Nusantara designs, installs, and services complete systems. They

are working entirely now with microcomputers and basking in the

expanding market that is being experienced in all parts of

Southeast Asia. RasiKomp Nusantara has plenty of competition as measured by the 25 pages of listings of computer and service companies in Jakarta's yellow pages.

The key to his company's success, says Adiwoso, is service. His insistence that his company have genuine access to the technology of the product and software they are marketing is paying off in their ability to give high quality service. Because his technicians know how their product works they are able to diagnose trouble and deal with it, he says.

Besides his full time occupation in running RasiKomp Nusantara, Adiwoso has occasional meetings with the Minister of Communications and the Director of Perumtel, the operating company for telecommunication services. He coordinates his activities with A.J. Habibie, the Minister of State for Research and Technology, who is a senior executive in Siemens. He has avoided, however, any formal relationship, preferring a free position where he can advocate what he believes is best, Adiwoso says.

Adiwoso explains some of the controversies that arise in these consultations. In the discussions about digitizing, Adiwoso was an advocate of a faster pace, which is the tactic

that Perumtel is now adopting. He has advocated a more vigorous move toward fibre optics than Indonesia has yet accepted. On the other hand he has discouraged proposals that Indonesia move into communication satellite construction, which he believes would be an economic disaster.

Adiwoso's confidence in the future reflects an expectation that his generation of educated professionals will increasingly take over the reins of authority in Indonesia. During the past 20 years, he says, hundreds of Indonesians have received professional education at home and abroad. Their experience, like his own, gives them a vastly different outlook from those who have occupied top positions in the past. The transition has already begun, and more and more young men like himself and Habibie are reaching positions of power in business and government. Commerce and industry, he cites as an example, will be run differently when led by professional men and women trained in the sciences, management, and finance. He expects to build RasiKomp Nusantara into a new type of Indonesian corporation--one that will one day displace traditional concepts of the business enterprise as a refuge for family and cronies.

Some Questions For Indonesia—And Some Answers

Many of Adiwoso's ideas are shared by Graham Steady, a
consultant to the Indonesian Ministry of Communications.
Steady's relationship with Indonesian telecommunications began
several years ago when he was at the Goddard Space Center in the
U.S. Now he is in Jakarta, advising the Ministry on questions
pertaining to the Indonesian Intelsat system.

Steady responds to questions about the reported inadequacies
of telecommunications in Indonesia. If you want to ruin your
day, he says, ask any banker about getting an operating line for
data communications. They aren't joking when they tell you about
the "motorbike interface" of the intra-city communications
network, he says. Indonesia is not a member of SWIFT, and the
international lines that banks use, except for the satellite
system, are unreliable. Leased internal circuits are all but
impossible to obtain, since line capacity is fully employed. The
most serious difficulty is with the switching system. With
little excess capacity, the switching is overtaxed and breaks
down often. Even when a businessman is able to get a leased line
he often finds it unusable because of deficient switching. Some
well-heeled multinationals have installed their own internal
lines as the simplest way out, he says.

Despite these current problems, Steady has optimistic

thoughts about overcoming them, in part because of the startling

improvements that have been made in the last 20 years. He thinks

that Perumtel is gradually ironing out its land line problems.

The switching difficulties may be corrected in the next three

years, as new digital equipment is installed and the inevitable

initial difficulties with new technologies are overcome. He

doesn't expect Perumtel to relax on releases of leased lines for

commercial purposes until demand for residential telephone lines

is in better balance. He sees some improvement already, as

evidenced in the reduction in price for new lines from $4,000

five years ago to a more moderate $400 today. Although this will

continue, Steady believes that it will be another 3-4 years

before leased lines will be available to meet the demands of

business.

As Indonesia gradually works its way up from present

difficulties, Steady believes that its telephone system will

become comparable to the best in Southeast Asia. By 1990

Indonesia should be ready to implement an integrated system

digital network. Steady's assessment, like Adiwoso's, looks to

the large number of communication engineers that Indonesia has

been steadily turning out. These men, Steady emphasizes, have been gradually supplanting the bureaucratic managers who have run Indonesia's telecommunications in the past. He expects this trend to continue, and the performance of the professionally managed system to improve steadily.

A Senior Engineer in the Ministry of Communications, F. B. Murwanto provides more answers about Indonesia's telecommunications. A light-hearted professional who likes to coin catchy phrases, Murwanto is one of the educated technocrats that Steady and Adiwoso talk about. Like Adiwoso, Murwanto has spent a lot of time in the U.S. and is familiar with the American telecommunication system.

The Indonesian satellite system, according to Murwanto, has been taking a major portion of resources for infrastructure improvement. He refers to both financial and personnel resources. The Palapa system serves a crucial political role in binding together the geographically widespread peoples of Indonesia. In no other way could Indonesia have brought the whole range of modern communications to all of its people in a few short years. But the cost has been great. Although the system now covers virtually the entire country, annual outlays

will continue at a high level. Replacement and maintenance costs

are high because of the limited seven-year life cycle of the

satellite. On the other hand, unit costs of usage should decline

as the capacity of the system increases with technological

improvements in the satellites and greater efficiency is achieved

in the terrestrial support operations.

While the Palapa system has been the glamour unit in

Indonesian telecommunications, other elements in the

communication system have been getting increasing attention.

Expansion of landline facilities has progressed steadily, with a

tripling in the rate of installation of line units in the 1970s,

and a comparable expansion of microwave and high frequency radio

circuits. Annual expenditures on telecommunications equipment

are double what they were ten years ago.

Nevertheless, as the initial gap between supply and demand

was enormous, a substantial shortage of lines still exists.

Perhaps one million or more additional lines could be absorbed in

the next five years. This is a gap, says Murwanto, that is not

likely to be closed for some while at the present rate of line

installation. Indeed, demand grows as fast as the economy. He

expects the gap to be substantially alleviated, however, in

another 3-4 years. He also remarks that the landline system is
in voice grade circuits and will remain so, except where special
high capacity lines are specifically installed. Murwanto says
that Perumtel has advised its data communication customers not to
use computer or data processing equipment that exceeds 4,800 bits
per second.

Digital switching will be available beginning in 1985,
Murwanto says, using circuit boards produced in a Siemens plant
in Bandung. Perumtel has conducted feasibility studies on a
public switched data network and concludes that demand would be
high thus making it profitable. Pilot studies have been run on
its installation, but a decision has not been made as yet on when
to begin, however.

An intra-governmental network is expected to be in operation
in 1984 within the city of Jakarta. This network, the GIN, is a
loop of 70 kilometers of cable, including some links in fibre
optics, and connects the principal government offices. This and
other locally operated networks will be able to transmit
inter-city when a satellite service is started sometime in 1984.
The inter-city satellite service is called PACKSATNET, an acronym
for packet satellite network. It will provide packet switching

and will be fully digital. VHF circuits are included in the PACKSATNET system so that high quality connecting lines will be available to supplement local telephone lines. The PACKSATNET system is being installed under a trilateral contracting arrangement, with Japanese hardware, British software, and an Indonesian firm doing the construction. Target date for PACKSATNET is 1983, but Murwanto expects that 1984 is more likely.

An influential study in Indonesia is a UNESCO assessment of data communications in the country. The UNESCO report, completed in 1982 after a two week survey, concludes that a public data communication system is urgently needed. The most pressing requirements, according to UNESCO, are for scientific data, libraries, and other public information.

Murwanto points out that Perumtel is not at liberty to allot resources wholly in accordance with technical or economic criteria. Perumtel revenues go to the treasury and spending for new facilities is done in accordance with budgets that are specifically appropriated. Even though commercial data communications might theoretically pay for themselves, according to Murwanto, other priorities may have a higher claim on Perumentel's appropriated resources.

It is these conflicting claims for resources, not
technological inadequacy, that may delay the advance of data
communications use in Indonesia. Even without higher priority,
Murwanto believes, however, that gradual improvement in the
telecommunication infrastructure should assure adequate data
communication requirements for business well before the end of
the 1980's.

Appendix I -- List of Interviews Included

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