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In the last year and a half since assuming the post of the director of the Electronics Policy Division, I have been struck by the mounting overseas interest in the Japanese computer industry.

In 1981, computer-interested government representatives, business executives, and influential journalists came to Japan from the United States, Canada, Great Britain, France, West Germany, Sweden, Brazil, and many other countries. Their questions had to do with Japanese Government policy for fostering the computer industry, measures taken to promote the development of high technology, the degree of Japanese market openness, the Japanese computer industry's competitive edge, the Japanese computer industry's overseas strategy, individual projects involving super-computers and fifth-generation computer system, etc.

In answering these questions, I have tried to explain the background circumstances leading to the planning and determination of government policies for the computer industry. Without a good knowledge of the background circumstances, it is impossible to understand not only MITI's views on the computer industry but also the role it plays in the development of the computer industry, that is, the relationship between MITI and the computer industry.

MITI spends a long time and much effort in formulating any policy measure.

The computer industry is an excellent example. MITI first assesses the international environment and the domestic economic environment, within which it examines whether or not there is a need to promote the industry. When such a need is identified, an industrial "vision" or goal forecast is drawn up. This industrial vision is reviewed every six or seven years. Most recently, the vision for informatiza-

tion and the information industry was thoroughly discussed over a one-year period from June 1980 to June 1981. Industry and financial representatives, academics, outside analysts, and computer customers were all invited to take part in the discussion. Any conclusion thus reached can be backed by a broad public consensus.

On the basis of the industrial vision thus formed, the problems faced by the computer industry are studied. A wide range of problems is discussed extensively from the standpoints of technology, demand, international environment, labor, and related industries.

Finally, the problems which must be solved if the vision is to be

implemented are divided into two groups: problems to be resolved through the efforts of the private sector and problems to be resolved through Government policy measures. In keeping with the Japanese dedication to the free economy system, the vitality and ingenuity of the private sector are given maximum play. MITI takes the stand that the Government should never do any more than to guide the private sector.

Moreover, the Government extends this helping hand only on those problems



Japanese Computer Government

which are not amenable to solution by competition among private enterprises alone.

In the field of technological development, on which I will elaborate later, private firms participate in Government projects. Thus private enterprises do "cooperate" with each other in promoting such Government projects. However, beneath this ostensible "cooperation" is intense competition among the private firms involved. After the stage of basic development is over, that is after the ter-

mination of a Government project, there is furious competition among the private enterprises to develop related products. Without this keen competition, the Japanese computer industry would not be what it is today.

Each of the European countries has only one national manufacturer of medium and large mainframe computers: ICL in Britain, CII-HB in France, and Siemens in West Germany. The government budgets for the development of computer-related technology are far bigger in the European countries than in Japan. Yet the national computer industries in Britain,

France, and West Germany have not, in comparison with the performance of the Japanese computer industry, demonstrated a strength proportionate to the size of their government budgets.

Many people tend to attribute the strong competitive edge of the Japanese industry solely to Government-initiated measures to support the industry. They are, very simply, overestimating the Government policy measures. The key factor has been the intense competition among private enterprises in the domestic market. The Government, with its policy measures, is simply setting the stage for a fair competition among private companies.

In other words, Japanese computer companies have grown strong as they have engaged in intense competition for survival in the domestic market shaped by Government policy. As a result of such competition, the number of large-model mainframe manufacturers has been pared from six in 1972 to three today. Having survived the competition in the domestic market, these three manufacturers have found themselves inadequately competitive in the international market.

Why Does the Government Promote the Computer Industry?

Looking back at the history of Japan's industrial policies, there has been noticeable shift of emphasis since World War II from the development of heavy and chemical industries to the development of knowledge-intensive industries and now to survival on the strength technology.

The computer industry is typically a technology-intensive industry which creates high added value. Secondly, it is a resources-saving, energy-saving industry requiring only small amounts of resources and energy for production. Thirdly, it is a high-technology industry with great ripple effect on other industries. Fourthly, the computer industry contributes to resource and energy conservation by related indus-

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tries. In view of the computer industry's obvious ability to further the upgrading of the Japanese industrial structure, the Government has included it among the country's leading industries.

Computers have gained increasing acceptance and application in industry throughout the 1970s. Particular progress was made in the manufacturing sector, with the result that a large part of the production process was automated and quality control was enhanced. In the clerical sector, repetitive routine work was computerized. The automobile, steel, electric appliance, and machine tool industries almost without exception began to use computer-related technology at an early stage—and this computerization is responsible for much of their international competitiveness. By contrast, industrial goods manufactured in countries with sluggish computer industries are lagging behind and gradually losing their international competitive edge.

In Japan, this entire process, and hence the key to the future, is called *joho-ka* or "informatization." Informatization is a general term which is used to describe all activity to perceive information and make a better use of it as a third element, after materials and energy.

The tasks facing the Japanese economy in the 1980s may be summed up as three:

First, as an economic superpower which accounts for 10% of the world GNP, Japan has to contribute to the international community.

Secondly, being a resource-poor country, Japan will have to establish itself as a technology-oriented country.

Thirdly, while sustaining the vitality of industry, Japan will have to strive for a comfortable life for its people. In other words, Japan will have to create a society where "vitality" and "comfort" co-exist.

Promoting an effective utilization of information will contribute to the realization of these three national economic tasks. Information-related technology will be the standard-bearer in Japan's drive to evolve into a technology-oriented country. Japan hopes to promote international cooperation through the use of information-related technology. Technology utilizing information will contribute not only to raising productivity and saving resources and energy in the industrial sector but also to solving social problems in the educational, medical, environmental, and administrative fields. Moreover, application of information in everyday life can make life more rational, more affluent, and more satisfying for the general public.

In short, informatization will contribute not only to attaining Japan's own national economic tasks but also to revitalizing the world economy through creating a highly humanistic information-oriented society supported by vigorous economic

activity, all the while making it possible for Japan to fulfill its responsibilities as an important member of the international community.

Yet the creation of an affluent information-oriented society demands the development of an information industry sufficient to support that society.

In a broad sense, the information industry embraces everything concerned with information, that is, publishing, radio and TV broadcasting, newspapers, and research. Yet in a narrow sense, the information industry means the computer and the data processing industries which together constitute the central pillars in the utilization of information. The computer industry, in particular, is the technological nucleus of all elements which promote informatization. Promoting the computer industry is thus prerequisite to making Japanese society information-oriented.

It bears repeating that the promotion of the computer industry will result in the promotion of other industries because of the ripple effect. And the promotion of other industries will eventually bring about the rationalization of society and life. Consequently, the creation of "a society of vitality and comfort" will become possible. At the same time, information-oriented technology will create opportunities for Japan to promote international cooperation. By helping to revitalize the world economy, Japan will be able to address its national economic tasks which it faces in the 1980s.

Present State of the Japanese Computer Industry

The value of the Japanese computer industry's output in 1980 amounted to approximately ¥1,300 billion. This is not as high a figure as one would expect from the attention the Japanese computer industry is attracting worldwide. However, compared with the 1975 production of about ¥540 billion, the industry has attained an annual growth rate of nearly 20%, which must be called very high.

Of all Japanese machinery and electronics industries, the computer industry has been the only import industry so far. Computer imports in 1980 were valued at ¥214.4 billion, as against exports of ¥121.7 billion.

Foreign computers were introduced into Japan very early. International Business Machine (IBM) Corporation established a Japanese corporation (Nippon Watson Computing-Tabulating Recording Co., Ltd.) in Japan in 1939 to manufacture cash registers. This company started the manufacture of punch cards in 1939 and the production of computers in 1963. In the early days, almost all of the computers

in operation in Japan were IBM. Indeed IBM was synonymous with computer in Japan.

Taking note of the importance of the computer industry, MITI promulgated the Law on Extraordinary Measures for the Promotion of Electronic Industry in 1957 and established the computer industry's position in industrial policy. The Government itself also undertook the development of computer technology. Research and development on computers was started at the Electric Laboratory under MITI's supervision (presently the Electro-technical Laboratory), and Japan's first computer "Fontac" was completed in 1965, 20 years after America's first computer ENIAC.

The ultra-high performance electronic computer was designated as one of themes for the large-scale industrial technology development program initiated by MITI in 1966. Electric machinery manufacturers participated in this project under the leadership of the Electric Laboratory. After about six years, a large-model computer was completed in 1971 as a result of this national project undertaken jointly by the academic, government, and business circles. This served as midwife to the birth of full-fledged computer manufacturers.

What gave a greater impetus to the development of computer manufacturers was a government project to subsidize the new model development which the Government implemented from 1972 through 1976 in preparation for the liberalization of computer imports in 1975 and foreign capital investment in computer manufacturing in 1976. Under this project, the six computer manufacturers split into three groups, each undertaking the development of computer models that can vie with the new 370 series announced by IBM in 1970.

The Government furnished the three groups with subsidies totalling ¥57.7 billion to aid their research and development efforts. The M Series (Fujitsu and Hitachi), ACOS series (Nippon Electric and Toshiba), and COSMO series (Mitsubishi Electric and Oki Electric) computers currently on the marketed are all offshoots of the technology developed by the three groups in the 1970s.

According to the *Computopia* magazine, IBM had over one fourth (28.7%) of the Japanese computer market in 1981. Japan's Fujitsu, Hitachi, and Nippon Electric followed in that order. It should be noted that foreign-made models (those produced with technology developed by foreign countries) account for nearly half of the total market.

Among electronic machinery and equipment which are said to be Japan's forte, computer is the only area where imports exceed exports in value. Moreover, foreign-made models occupy nearly half of the domestic market. This point must

be borne in mind when discussing the Japanese computer industry.

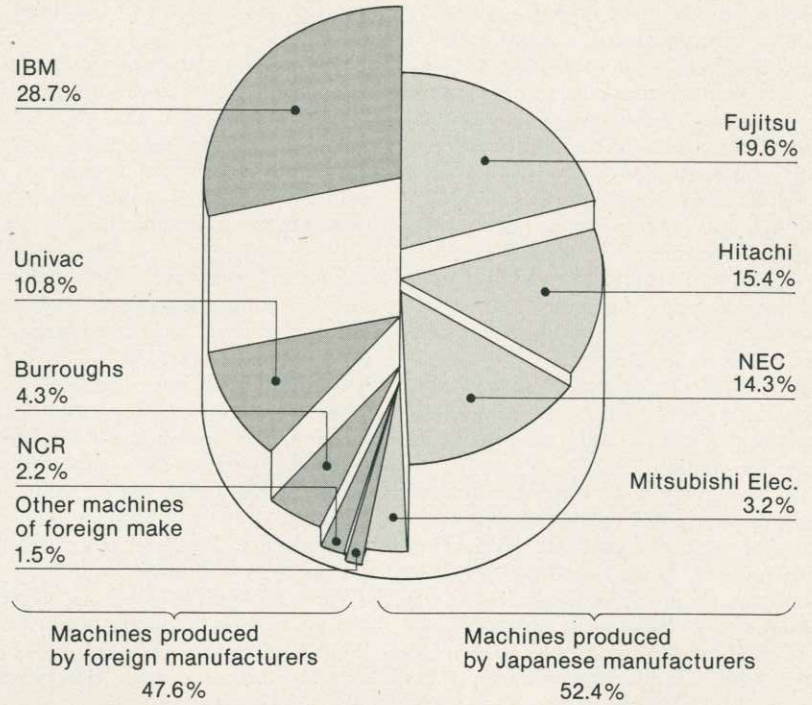
There is still some misunderstanding as to whether Japan's market is fully open to foreign manufacturers.

To be sure, the import of computers was not liberalized until December 1975. However, imports have been completely liberalized and the domestic Japanese market thoroughly opened to foreign computer manufacturers. In addition to IBM, Burroughs, Univac, Nicksdorf, DEC, Intel, Apple, and others are doing business freely in Japan. All the leading foreign businessmen I met in 1981 expressed satisfaction with the way their organizations do business in Japan. Judging from this, there is no doubt that the Japanese market is now fully open.

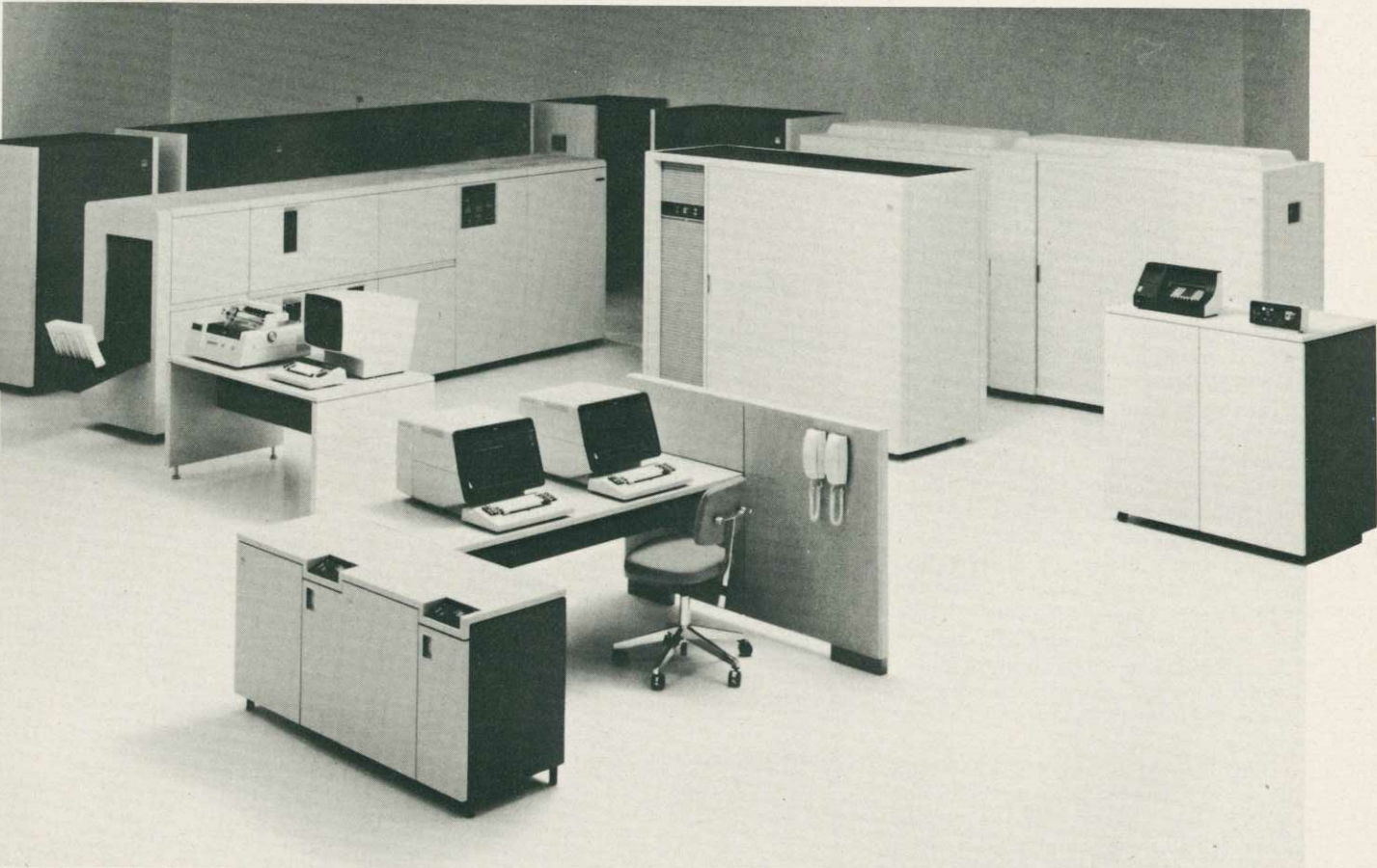
There has, however, been criticism that the Japanese Government and public offices purchase very few foreign models as compared with those purchased by the private sector. Yet it is up to each customer in a free market to decide which model he wants to use. In the days when Japanese computer manufacturers were lagging behind foreign manufacturers, the major public utilities and *sogo shosha* (general trading firms), banks, insurance companies, other financial institutions, steel producers, automakers and other big manufacturers bought foreign models. It was only in the Government and public

Market Shares of Domestic and Foreign Manufacturers in Japanese Market

Domestic manufacturers' share in the Japanese market is approximately 52%, and foreign manufacturers' share is approximately 48%.



(As of the end of June 1980. Based on actual monetary amounts.)
Source: January 1981 issue of *Computopia*.



IBM again outstrips Japan in the computer development race with its new model—the 3081