COMPUTERS IN CHINA: WHERE THE CHINESE ARE; WHERE THEY WANT TO BE

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ABSTRACT

The purpose of this paper is to detail the extent of computer activity in mainland China: hardware, software and enduse, and to examine the ramifications such activity has with respect to the USA. Much of the information is based on the author's findings during a recent mission to China. The message is that China possesses a burgeoning computer industry, but one which is at our own 1965 level. The ten years of Cultural Revolution anarchy are responsible for this backwardness. However, Deng Xiaoping, China's present leader, is determined that China will take its place with industrialized nations. This means increased opportunity for the US computer industry and the prospect of economic competition in the computer arena.

INTRODUCTION

Recently the author visited China as a member of a US diplomatic mission. While in China the mission enjoyed delegation status and members were able to exchange points of view with China's top policy makers and scholars.

There were two reasons for this visit. First there was the intent to renew and extend the ongoing relationship Seton Hall University (1) has enjoyed with China in the post cultural Revolution era. Since 1978, Seton Hall has been educator to China's scholars and trade statesmen in the modern practices and policies of international business and finance. Second, there was the goal to investigate the effect of China's new economic freedom on the potential for an increased computer relationship with China and to determine the extent and rate of growth of computer usage in China.

The purpose of this paper is to present the results of goal two and to discuss these findings in relation to American business opportunity in the computer area.

China is so immense that it can be

anything anyone wants it to be. All things are true when 25% of the world's population (1 billion people) is involved. China boasts metropolitan cities such as Shanghai, Guanzhou and Beijing, where one has ready access to theatre, new books and the latest western fashions. China also has peasants living in thatched huts, still tilling their fields with water buffalo and wooden plows . . . just as their ancestors did 3000 years ago. And China has everything in between. But mainly China is rural, with 80% of the population earning their living from the land.

Why should the US be anything more than casually interested in China's computer activity? First, because the computer age is dawning in China. Potentially a huge market, China has an operational computer base which is only a fraction of industrialized nations. The potential alone of its 400,000 industrial enterprises, most undercomputerized, is enormous.

Second, as a supplier of labor. The price is very attractive. For 10 minutes of labor in China you pay 5 cents versus 20 cents in Korea and 80 cents

in Japan. Moreover, China is anxious to sell its labor. Joint ventures with US companies are of high priority in the People's Republic. Software consortiums are springing up, with Chinese experts writing the programs at a fraction of the price such software would cost in the USA.

Third, because there is an excellent chance that China will be our fiercest economic competitor in computer technology in the not so distant future. The Chinese are known for their energy and entrepreneurial flair. Only inside China has that natural knack for making money unnaturally suppressed (Business Week, 1985). But with the demise of Mao, it has become ok to get rich in China, and hundreds are now earning over \$10,000 annually in small business ventures (average annual income = \$300). To be sure this is not a large number, but government sanction of private enterprise is a very recent event.

As one example of Chinese ingenuity, consider this incredible achievement: the creation by technicians, during less benign times, of an IBM type 4331 computer from manuals and books smuggled in from the US. Now that they are unleashed, what will one billion Chinese with ample supplies of iron, coal and oil do once they enter the world market? Look what Japan did with 100 million and no natural resources.

MAO

To understand why China is only now seeking a place among industrialized nations, one must examine China's recent disastrous past, Mao's ten year Cultural Revolution.(2) Mao, it can be said, is China's greatest saint and greatest sinner. After he swept aside the corrupt Nationalist regime in 1949 and installed communist rule, China had, for the first time in centuries, a government which successfully provided all of its people with a basic level of subsis-

tence. To his lasting credit, Mao made the impossible a reality.

The period from 1949 to 1958 (the Russian Period) was marked by continued prosperity of a limited sort, an ever closer relationship with Moscow and Moscow's heavy industry philosophy, and a glorification of urbanization.

However, the relation with Russia was not any easy one and dissatisfaction with Moscow mounted as the heavy industry plans failed to produce results, and because Moscow failed to support China in Korea and in a number of China's "important" projects, paramount among which was the development of a nuclear device.

Thus, in 1958, Mao initiated a new direction, his Great Leap Forward. Self-sufficiency and the development of a Communism uniquely Chinese were key elements in his plan, as was a repudiation of the urban contingency which he had come to regard as lax and disloyal to the credo of his "ongoing" revolution. Scientists and technicians, particularly, were suspect. Mao turned to the commune and glorification of the farmer-peasant.

Unfortunately, a hastily formed unthoughtout commune system, composed of units of 5000 families, and an extended period of bad crop weather combined to produce three years of famine, referred to as the "Three Hard Years".

A Readjustment Period (1961-1965) followed with the ascendancy of the soldier-communist to national role model. Army uniformity and discipline were seen as the vehicle to transcend class and regional loyalty. At the same time the commune system was revised to teams of twenty to thirty families.

But all this was prelude to the great sin of Mao, The Cultural Revolution of 1966, which lasted until a month after his death in September, 1976. As he

aged, Mao became ever more frustrated by criticism and opposition and resolved to transform the Chinese bureaucracy into a popularly based system which he would personally lead. He modelled himself into a demigod, the center of a pan-China personality cult. He created a new system of education (or better, non-education) designed to eliminate differences between town and country, worker and peasant, and mental and manual labor.

In these efforts, Mao turned for support to the army and the youth. The Red Guard was born, millions of youths organized into semi-military groups. They soon roamed the land. Commandeering trains and buses they stormed through towns and cities purging all persons suspected of revisionism, i.e., anyone with a possible intellectual tie.

China was confronted with 10 years of total anarchy and hysteria. Only those areas designated as national security installations escaped. As one Chinese-American said at a recent interview, "The fear and the violence were bad, but even worse was the constant change in structure. In your town you never knew who to obey. Those in power one day were being purged the next. It was as if the world were coming to an end."

All schools and colleges were closed. Purging ran unabated. Skilled technical people, older officials, the party's own functionaries and theoreticians and especially educators and scholars were systematically castigated. Forty million people were imprisoned, exiled to the fields or executed. Mao and his followers, lead by the hardline Gang of Four, were intent on eliminating the entire class of intellectuals.

A generation of educated people were lost and replaced by a generation of illiterates. Today, people from about 40 years old and on are educated. But people from 25 years of age on to the

late 30s are unable to function in a modern world. Twenty million strong, they are the equivalent of the western bum and are referred to as the "rootless ones".

Students still suffer due to the book-burning and school-wrecking of the Cultural Revolution (Gibney, 1985). Because of the Cultural Revolution, Mao's brand of Communism has been rejected as the road for China to follow.

DENG

After Mao's death and the deposing of the Gang of Four, it took two years for China to finally chart its new course, under the direction of Deng Xiaoping, now (1986) 81 years old. Ironically, Deng had been a leader under Mao from the pre-1949 beginning, but had lost favor during the intervening years and miraculously survived four separate purges.

1976 to the present is referred to as the Second Revolution. It is Deng's attempt to blend seemingly irreconcilable differences, state ownership and private property, central planning and competitive markets, political dictatorship and limited economic freedom. Deng appears to be attempting to combine Communism and Capitalism (Church, 1986).

Deng's problems are monumental. He has a relatively small core of lucid modern leaders. These are the officials the foreign businessman meets. They are intelligent, informed and eager to learn more about Western management.

But behind these people is a centuries old China. With hundreds of thousands of bureaucrats angry over their loss of power, trying to sabotage the reform. With legions of young and old Maoist diehards trying to subvert progress which they refer to as Western spiritual pollution. With a recalcitrant military, unhappy with Deng's

priority for consumer goods over weapons. With the mass of ordinary citizens envious of the new rich class. Moreover, Deng is overseeing a bloodless purge of his own, as he attempts to rid his government of the mass of inherited incompetents. Seventy percent of the party's 40 million members are illiterate. Struggles erupt as Deng inspires factory managers wrestle control from party bureaucrats.

Deng's policy is to encourage light industry and production of consumer goods, which are in short supply. Currently there are rising expectations and this is what Deng is counting on. Family goals, which use to center around ownership of a watch, sewing machine, radio and bicycle, have shifted to a new big four of a refrigerator, tv set, washing machine and motorcycle.

COMPUTER SECTOR

Where do computers fit into the scheme of things? Many Westerners think of China as computer deficient. It must be emphasized that this notion is incorrect. China has a burgeoning computer economy. True, it is about 20 years behind the industrialized world, which puts it where the United States was in the middle 1960's. But even as far back as 1965, if the reader will remember, the US was heavily computerized and proud of its computer prowess.

China is predominantly in the microcomputer business and to a lesser extent in the minicomputer and mainframe business. But today's micros are, of course, more powerful than most mainframes of the mid-1960s.

Microcomputers, to a great extent, best suit the Chinese personality. They have a desire for privacy, even secrecy, and fear of divulging data, traits developed by the long series of purges the country has endured. Microcomputers also appeal to the Chinese love of self-sufficiency, developed through

ages of tilling the soil. The individual can control the micro.

As a result, micros are used at a much higher level of sophistication than in the USA. For example, at the prestigious National Institute of Metrology, which controls standards, all scientific applications are performed on a mixture of Chinese built and American micros.

Our Chinese hosts estimated that there are about 80,000 microcomputers in China, half of which are Apples, TRS-80s and Cromencos. The other half are China's own products. Of course, 80,000 micros constitute only three percent of the worldwide count of installed micros. Furthermore, these same hosts lamented that at least half of their micros are very poorly utilized, with many being idle because of lack of knowledge, lack of software and lack of maintenance. These estimates are viewed as accurate by American observers.

Among US mainframe manufacturers, Digital Equipment Corp has the edge, with nearly 600 machines installed. The reason is due to the industrial-scientific orientation of DEC's machines and also to the very important fact that one of China's popular DJS models was created by breaking down and copying a PDP-11. Thus, the Chinese feel comfortable with DEC architecture (Byles, 1985).

Deng's "Four Modernizations" program provides the framework and the impetus of China's industrialization. The areas of modernization are Industry, Agriculture, Technology and Defense. The thrust is one of self-sufficiency, a doctrine which Mao, himself, promulgated, because, in addition to fitting his plan, he recognized, as does Deng, that such a policy is already a given and automatically elicits support. Deng's rule is: No foreign imports except in case of "dire need". Import knowledge, not products.

CENTRALIZATION

The People's Republic has a high priority on the electronics and computer sectors of its economy, with a goal of establishing, by the year 2000, a technology base equal to those of the leading industrialized nations. A slogan regularly seen in the People's Daily is "If you do not want your enterprise left behind, please pay attention to computers.". Factory managers are encouraged to enroll in special computer courses designed expressly for them. Major cities and provinces have computer leading groups (for broad planning), a computer industry corp (for managerial advice), a software development site, a computer training center and user consultancy groups.

If such centralization seems strange to the reader, it must be kept in mind that China is still, and will continue to be, highly socialized, with the state controlling production and planning (except for light industry).

China's domestic computer industry dates back to 1958. There are 115 factories turning out everything from subassemblies to mainframes. Fifteen of these produce finished micros, minis and mainframes. The remaining 100 produce subassemblies, supplies and peripherals. In 1984, the last year for which figures are available, 400 million dollars were spent on computer hardware, of which only 170 million went for imports. Even as far back as 1982, China installed 3800 computers, of which only 700 were imports. The market is growing at 20% each year.

PROBLEMS

However, problems abound. All connections are hand soldered, which presents a quality control nightmare. Because of the non-existence of automation, quality is low. Further, hardware configuration defies standardization because there is such a mix of home brew and copied American, Euro-

pean and (older) Soviet models. Even more frustrating is that each factory proudly adds its own innovations to the blueprints received from other factories. More than 150 models are produced by the factories and research institutes (which are involved in limited production). Combine this lack of standardization to an existing short supply of maintenance personnel and the result is devastating. Long periods of down time are commonplace.

Additionally, the computer industry suffers from the Chinese phenomenon of overspecialization. At one site one hardware engineer was devoted entirely to line printer support. At another site, hardware support for one mainframe and four micros consisted of five engineers and five assistant engineers.

Non-the-less, lack of peripherals is the most serious problem and the greatest barrier to widespread use of the computer in industrial circles. Many enterprises which have access to domestic computers cannot use them effectively because they lack storage devices. Data must be entered via antiquated keypunch units and read from paper tape output.

Telecommunications is an impossibility due to the unreliable phone system. An example of Chinese resourcefulness in pushing inadequate technology to its limit is the agency which routinely collects data at a remote site on an Apple II floppy and then bicycles it through Beijing to its central site where the floppy is read by another Apple II for uploading to a Burroughs 6810.

USA EXPORT POTENTIAL

In the areas of peripherals and telecommunications the US obviously has a large potential for export to answer "the dire need". But we were enemies with China not too long ago and as a result US export restrictions exist. The US government requires

that each sale be written up separately, with the exporter providing diagrams and explanation of how the enduser will configure the system. This is difficult enough for stand alone units. It becomes nearly impossible in the case of peripherals. Who knows how the unit will be used? The information must be gotten from Chinese inside the factory or agency. Retailers yearn for distribution licenses permitting multiple sales under one licence. This is not likely says the Commerce Department. In spite of this, it is predicted that the market for floppies will be an area of major opportunity for US suppliers (Brown, 1983).

Chinese manufacturers know that their products are inferior and, due to lack of automation, much more expensive than foreign makes. Chinese micros cost from \$8000 to \$10,000. Despite the severe US export restrictions they fear for their future and are calling for high tariffs to protect their backward businesses.

The answer to the red tape, the tariffs, and the "buy China" policy is for the foreign company to set up a joint venture with the Chinese. Burroughs, IBM, HP, Data General, DEC, and Honeywell have already established such joint ventures. And more such agreements are being signed on a regular basis. But a big bucks investment is required and payback is cumbersome since China does not permit hard currency to leave its borders.

SOFTWARE BUSINESS

It is in the area of software that China is experiencing its greatest success and anticipating a prosperous area of export. Chinese talent, drive and ingenuity can create a first rate software capability (Wood, Reifer and Sloan, 1985). What does it take? Specifications, a willing mind and a sharp pencil. One example of this drive into the international software market is the Shanghai Software Con-

sortium, a group of 30 professors and other computer specialists. The consortium produces software at a finished cost 67% less than the US cost (Wall Street Journal, 1984).

China recognizes that it must concomitantly develop its pool of programmers for domestic work and has set a goal of having 100,000 software specialists by 1990, up from 16,000 today. Until recently programming was done primarily in ALGOL. However, there has been a migration to FORTRAN IV and more recently to FORTRAN-77. BASIC and COBOL are widely used, and C is becoming popular. As an aside, among the Chinese contingent at Seton Hall, in the computer curriculum, COBOL courses are considered very important.

In the development of domestic software, the emphasis is on programs for industry, science and education, rather than on commercial applications (bookkeeping, finance, etc.). Payroll applications are virtually nonexistent since employees are paid in cash.

Applications are not developed on site, but at government centers, such as the Beijing Municipal Computing Center. Among the Center's finished large scale applications are the Beijing municipal automotive spare parts inventory, a national rail shipment system for priority goods, the Beijing insurance information system and the Beijing municipal government energy resource management system (Wood, Reifer and Sloan, 1985). The Center also devotes considerable energy to ongoing research for development of an efficient Chinese character input and handling system.

Universities are also involved in software production. In fact, most serious university work is in the area of software applications.

TRAINING AND EDUCATION

Has training kept pace with hard-

ware and software acquisition? As paradoxical as it may be, China currently seems to have more computing power than it can use and support. There are simply not enough trained personnel to go around. The number of people attending colleges, in general, and computer programs, in particular, is small. The computer labs the author visited were sparsely populated versus US counterparts. China has only 1.3 million college students, versus 10 million college students in the US with one fourth the Chinese population. China has 170 universities and other higher education institutes, versus a US count of 3243 (1982 encyclopedia figures).

Further, computing power is just one aspect of the university budget, and in many cases the facilities are woefully inadequate. It is not unheard of for an academic computing center to have no computer at all. More than hearsay, this was the author's own experience at one university in Wuhan, where, following a formal request to tour the computer facility, she was shown an empty room and given a lavish description of how someday it would house appropriate hardware. In actuality, the center possesses one TRS-80 micro. In situations such as these, the instructors receive the programming assignments and "play computer" to find the students' errors.

On the positive side, 28 select universities boast super modern facilities due to a \$200 million World Bank University Development Project. Honeywell was a major benefactor of this project, being chosen to install at least 14 of the required mainframes.

To circumvent the educational bottleneck, thousands of students (and faculty) are being sent abroad to study in computer science, and there is an ongoing program to entice Chinese computer experts to relocate to the homeland.

ADDITIONAL OBSTACLES

There are yet additional obstacles to the popularization of computers in China. The vast mass of Chinese do not understand English. The Chinese language is composed of 50,000 characters; it is said that knowing 1200 of them enables one to read 95% of all Chinese writing. Although many agencies, both in China and foreign are working for a solution, to date there is no efficient method for entering and dealing with Chinese characters. This is especially relevant to US firms, for whoever comes up with a straightforward solution on a micro will have the inside track at cracking the enormous government market.

A second, more insidious obstacle is that the Chinese population is naturally antagonistic toward computerization. While the West is shifting to automation which increasingly excludes workers from the manufacturing process, the Chinese philosophy is to use as many people as possible to do a job. There is an awesome number of people who need to work. Since labor is cheap, there is no necessity for labor saving technology. Moreover, the iron rice bowl policy, from Mao, posits that every Chinese is entitled to a salary. Because there are more workers than needed, factories are overmanned. In fact, factories exist in which nothing has been produced for years. The people fear any reorientation. This is a danger to Deng, for the people hold the power.

COMMITMENT/ANXIETY

However, he and his leadership are fully committed to achieving modernization. They seem to have a respect for individual rights and are relaxing the puritanical government hold on the populace. Worker initiative is now being rewarded. Anyone who wants to start a business and make a profit, can (seven employees, maximum). Knowledge and ability are replacing political

rhetoric as the avenue to advancement. "Seek truth from facts" says Deng.

Yet there is anxiety in every sphere. Survivors are quite conscious of the spasmodic cycles of self-destruction China visits on itself. There is the bitter memory, for example, of Mao's short lived 100 flowers policy of 1956. "Let 100 flowers blossom, a hundred schools of thought contend." The policy explicitly encouraged free ranging discussion and inquiry (with the hidden assumption that this would prove the superiority of Marxism). The ensuing and unexpectedly harsh criticism and general anti-party sentiment resulted in a precipitous about face. The leadership's explanation was that Mao had laid a trap for subversive elements. All who had expressed themselves suffered the party's full vengeance.

Is Deng moving too fast and setting the stage for a backlash, a new round of oppression? Deng's colleagues are in their seventies. No strong leader has appeared to oppose Deng's policies, but will the new leaders who assume control when Deng dies continue on his course?

OPTIMISM

For his part, Deng is pragmatic and optimistic. He is forcing resignations of older senior officials. His government is dedicated to meeting the needs and expectations of its people. He believes his people are pleased with their increasing prosperity and personnel freedom. And why not? His plan is to keep expectations slowly rising. In the final analysis, every day Deng's policies survive makes them harder to reverse.

With respect to the computer segment, barring a return to anarchy (which is highly unlikely) computers will become an increasingly indispensable tool. How else can China equitably govern its multitude of people? Consider alone the organizing of statis-

tical data. How else can the factories operate for the betterment of Chinese life? "If you do not want your enterprise to be left behind, please pay attention to computers."

FOOTNOTES

1. Among the members of the mission in addition to the author, the Associate Dean of the Seton Hall School of Business, were the following Seton Hall University (South Orange, NJ) officials: Monsignor John Petillo, Chancellor of the University, Dr. Charles Dees, Vice-Chancellor for University Affairs, Dr. Jack Hampton, Dean of the School of Business, Dr. Kathleen Dirschel, Dean of the College of Nursing, Dr. Bernhard Scholz, Dean of the College of Arts and Science (which houses the nationally respected Asian Institute) and Dr. Winston Yang, Chairman of the Asian Studies Department. State Senate Speaker Carmine Orrechio was the government representative. ATT and K-C Imports Inc. sent representatives whose purpose was to make contacts for their businesses through Seton Hall introductions. (Nowhere in the world are protocol and introduction so important to business relationships as in China.)

2. As an aside, a prerequisite for successful business relationships in China is a knowledge and reverence for Chinese history. Historical events are frequently alluded to during business negotiations, and the foreigner is expected to comprehend and appropriately respond to such references.

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