

## CHANGING CHINESE THINKING ABOUT TECHNOLOGY TRANSFER

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### INTRODUCTION

THE year 1978, when China made its decision to adopt an open policy to the outside world, marked a major change in direction in debate in that country on the subject of technology transfer. The works published on that subject since then can be roughly divided into two categories in terms of their character: at first most of them were aimed at popularizing the new open policy and emphasized the necessity for it, including the introduction of foreign technology, or discussed practical details such as what kind of technology should be selected for the time being and the way in which it should be introduced, but in 1982 works began to appear that dealt with the subject of technology transfer on the theoretical level from many different angles, those dealing with the future orientation of technology transfer surpassing the others in terms of both quantity and content. The present paper is a survey of the main such works for the purpose of considering recent change in Chinese discussion of the subject of introduction of foreign technology and determining what Chinese policy on this subject is likely to be during the Seventh Five-Year Plan period, which starts in 1986.

### I. CHINESE THINKING ABOUT TECHNOLOGY TRANSFER BEFORE 1982

After the founding of the People's Republic of China, the Chinese Communist Party has continually adopted an active policy of introduction of foreign technology, the only exception being the period of the "Gang of Four," 1975-76, and there were four waves of transfer of foreign technology: 1953-58, 1963-65, 1971-74, and 1978-79. There was some transfer thereof on other years as well, but not much in comparison to those periods.

With adoption of the policy of opening China to the outside world by the Chinese government in 1978, the decisive step was taken to major importation of technology and capital. That was a period of opposition to the two consecutive preceding policies, i.e., that of the "Gang of Four" in 1975-76 of refusing to introduce foreign technology and that of the Hua Guofeng regime in 1978-79 of introduction of large plant technology, which was, needless to say, a reaction to the policy of the "Gang of Four," indeed an overreaction considering China's foreign exchange situation at that time, as symbolized by the incident in which the contract with the Nippon Steel Corporation for the Shanghai Baoshan Iron and

Steel Complex was cancelled. The policy line in the period of the Sixth Five-Year Plan (1981–85) concerning transfer of foreign technology was basically oriented toward criticism and rejection of the policy lines of the preceding periods.

Let us consider what the different policies adopted during the wave periods had in common and how they differed according to the international situation that China found itself in.

First, let us consider the different categories of technology transfer.

(1) Classification according to the form of technology

- (a) Technical information
- (b) Introduction of design documentation
- (c) Introduction of design documentation and main equipment
- (d) Introduction of design documentation and entire plants
- (e) Introduction of design documentation, equipment, machinery, operating techniques, and management techniques

Design documentation can be subclassified into basic design and detail design, but we will not make that distinction here. Point (e) is what is known as technology transfer on a full "turn-key" basis, including both hardware and software.

(2) Classification according to how advanced the technology is

- (a) The latest technology
- (b) Technology developed since the sixties
- (c) Technology developed before 1960

The difference between technology developed since the sixties and that developed before that is the difference between batch systems and automatic systems in process industries and the difference between use of solid fuels and liquid fuels. It can also be considered as whether or not electronic technology has been adopted for the nervous system of the technology in question.

(3) Classification according to the economic criteria of the technology

- (a) Technology transfer in which priority is given to technology import substitution
- (b) Technology transfer in which the technology is imported again and again in large quantities with the same specifications

The points of these classifications that China's technology transfer has had in common throughout the period in question are introduction of design documentation and entire plants (point d of classification 1), the latest technology (point a of classification 2) and technology transfer in which priority is given to technology import substitution (point a of classification 3). It was consistently its policy to import the latest technology to serve as a model. The basic reasons for this were China's foreign exchange position and pride.

In the third wave of technology transfer, there were two changes. First, a shift from the policy of technology import substitution to a policy of giving priority to economic efficiency was taken place. This is represented by the fact that thirteen urea plants all with the same specifications were imported from Mitsui Toatsu Chemicals and Kellogg Company. Second, payment for software was first recognized in 1972 in connection with the introduction of various kinds of equipment to the Wuhan Iron and Steel Corporation with Nippon Steel Corpora-

tion as the general contractor. Up to and including the second wave of technology transfer (1963–65) the Chinese did not even consider paying for software.

The more recent change in the eighties was the adoption of policies of introducing not just hardware but software as well and of introducing technology other than the latest technology. Such policy change is in conformity with the shift in emphasis from construction of new plants to technological upgrading of existing plants.

This change does not mean that China has forsaken its policies of introduction of the latest technology and of import substitution, which it has maintained consistently since the fifties. It will continue to uphold them. Rather, it should be interpreted as a widening of options to include both the latest technology and the technology of the sixties and both hardware and software in order to cope with the new situation.

Let us now consider the salient features of Chinese thinking on technology transfer since 1982.

## II. THE QUESTION OF SOCIOECONOMIC DEVELOPMENT STRATEGY AND THE QUESTION OF TECHNOLOGY TRANSFER AS MOST RECENTLY CONSIDERED

Since about 1982 there has been a great deal of discussion in China on the subject of socioeconomic development strategy.

In one of the earlier papers published on this subject, “Guanyu woguo jingji fazhan zhanlüe wenti de renshi” [Perception of the question of China’s socioeconomic development strategy] [13], Sun Shangqing identifies population, technology, and resources as three basic determining elements of development strategy. According to him, technology is already a major means of development of production power in the modern age when considered from the Marxist point of view, and furthermore there are three theoretical means of developing production power: (1) increasing labor power, (2) rationally organizing the different elements constituting production power, and (3) innovating and revolutionizing technology. He suggests that technological innovation or “technological revolution” is the best way of developing production power and stresses the importance of technology.<sup>1</sup>

This stand originates in Deng Xiaoping’s address to the National Science Conference in March 1978, which overturned the argument of rejecting technology transfer that held sway in 1975–76. According to Deng, “Knowledge is power,” and this assertion theorized the point that knowledge is an important element of production power.

Among the papers that have dealt with the conditions for determining China’s own development strategy is Yu Guangyuan’s “Guanyu zhongguo shehuizhuyi

<sup>1</sup> In another paper [14], Sun Shangqing clearly identifies technological transformation, i.e., what is referred to as technological innovation or “technological revolution,” as being one of the tasks that should be given the highest priority by China.

jingji, shehui fazhan zhanlüe wenti de kexue yanjiu" [Scientific research on the question of socioeconomic development strategy of China's socialism] [19].<sup>2</sup> In it he points out five features of China's circumstances that are determining with respect to China's development strategy: (1) the fact that it has a population of 1 billion; (2) the fact that China can be divided into two parts in terms of population distribution and the state of economic development, i.e., eastern China and western China; (3) the pronounced interregional gap in economic and technological terms; (4) the fact that 80 per cent of China's population of 1 billion live in rural areas; and (5) the large overall technological gap between China and the advanced countries of the world. In his comments on that international technological gap, Yu indicates his strategic ideas about technology transfer in quoting Marx on Newton ("There is no telling how much time it took Newton to discover his law, but in the present day even a schoolboy can learn it by attending class for an hour.") and stating that because of that technological gap China can develop its economy by making use of the latest technology of other countries.

The background of frequent publication of such papers on socioeconomic development strategy has been the collapse of the policy line of "extensive expansion" of production (i.e., the policy line of achieving quantitative expansion of production power by means of high investment) that was so strongly espoused after expulsion of the "Gang of Four" in 1976. The low economic growth around 1982 as a result of the economic adjustments that were made in 1979 and the following years gave rise to the quest for a new policy line as well as a new development strategy with technological innovation as its central force.

With declaration at the Twelfth National People's Congress of the Chinese Communist Party in September 1982 of the strategic goal of quadrupling the total industrial and agricultural production figure of 1980 by the year 2000, development strategy came to be discussed, mainly in terms of the already established policy line of "intensive development" of production capacity (i.e., the policy line of achieving qualitative development of production capacity by pursuing economic efficiency) and the concrete policy of "technological transformation" of existing enterprises as the embodiment of that theoretical line.

For instance, in his paper, "Guanyu jishu jinbu wenti" [On the question of technological progress] [10],<sup>3</sup> Ma Hong, after asserting that future development of production will have to rely on technological progress per se on the one hand, and "technological transformation" of obsolescent enterprises on the other, states that under conditions of insufficiency of energy, transportation capacity, and funds production should be increased by raising socioeconomic efficiency, i.e., by enhancing the quality and grade of products through technological progress on the part of enterprises and by economizing on energy and input materials. He also sets forth the idea of attaining at least 50 per cent of the planned increase

<sup>2</sup> This paper is reported to have been the text of an address delivered in Hong Kong in 1982 (data unknown).

<sup>3</sup> This article is reported to have been written on September 29, 1982.

in total industrial and agricultural production of more than two thousand billion yuan in the twenty-year period up to the year 2000 by technological progress. In addition, in discussing long-term planning for production and science and technology, he identifies the purpose of technology transfer as being faster development of Chinese science and development and strengthening of the country's self-reliance capacity and stresses the need to save time and money in China's technological development by technology transfer involving advanced technology that is compatible with conditions in China and priority is given to technology in the form of software.

In another paper, "Guanyu shixian zhanlüe mubiao de buzhou wenti" [The question of the procedure to be followed for achievement of strategic goals] [11], he proposes the strategic goal for China's technological development of equipping all Chinese mining and industrial enterprises with the technology that was prevalent in the economically advanced countries of the world in the seventies and early eighties by the year 2000.<sup>4</sup>

Of the many papers published on the subject of Chinese development strategy, Huang Wen's "Jishu xuanze yu jingji fazhan" [Economic development and choice of technology] [7] restricts itself to discussion of technology per se. In it he explicitly presents the following ideas on the strategy of technological development: Advanced technology has to be adopted in the core sectors and fields of the national economy, but considering China's limited financial and physical resources and plentiful labor, an effort should be made to achieve a balance between producer goods and labor power, and the country as a whole must have a multistratus technological structure. In other words, sectors representative of the developmental orientation of technology and capable of achieving pronounced improvement of economic efficiency by technology-intensive production should undertake technology-intensive production, and sectors capable of easily digesting new technologies in which increase in labor input results directly in increased production and improvement of economic efficiency should, as far as possible, undertake labor-intensive production, using appropriate technology in large quantities and complementing it with handicraft-type technology.

However, Huang Wen does not think that the fact of whether or not particular technology is up-to-date technology should be the sole criterion for China's selection of technology. Rather, considering the various limiting conditions, he sees labor-intensive industry as the proper mainstay of Chinese industry. Furthermore, as for the choice of technology, he opts for the kind that will mitigate the contradiction between economic development and depletion of natural resources, i.e., the kind that economizes on natural resources and substitutes

<sup>4</sup> Another representative article published after the setting of the strategic goals for the year 2000 is Sun Yanfang [15]. This article advocates putting emphasis on agriculture in China's development strategy and, in discussing manufacturing industry, identifies "technological transformation" of existing enterprises as the means of achieving reproduction on a progressive scale in it as well as asserting the appropriateness and the necessary conditions thereof from a macroeconomic viewpoint. It does not, however, say anything about technological development or technology transfer.

them. As for interregional strategy of technology development, he favors raising the rate of self-sufficiency of inland areas in terms of supply of industrial products by having coastal areas serve as a source of technology transfer to inland areas over the hitherto espoused inland-coastal dichotomy marked by exchange of the industrial products of coastal areas for the raw materials of inland areas. More specifically, he proposes that the coastal areas continue to import advanced technology from abroad and in so doing pass the equipment that is replaced on to inland areas so that there will be systematic upgrading and change of the products of the coastal areas and a transfer of production of lower-grade products to inland areas.

A work that deals with the subject of the medium-term and long-term goals of Chinese technology transfer is "Guanyu woguo duiwai jingji huodong de fazhan zhanlüe" [The development strategy of Chinese foreign economic activity] [2] by Gao Dichen, Wang Baochen, and Chen Jiaqin. The book discusses the individual strategies for commodity trade, borrowing of funds, import and export of labor, and science and technology and management experience exchanges. The authors identify the strategic goals of science and technology and management experience exchanges as follows: in the 1980s the main strategy was importation, as far as the country is capable, of appropriate, advanced, reliable technology and overall improvement of economic efficiency through absorption, digestion, and dissemination of imported technologies. The first five years being devoted mainly to introduction of technology (software) and management know-how to make it possible to promote "technological transformation," and in the next five years to continuous innovation of technology in an effort to establish an innovation cycle to that economic, scientific, and technological development could be furthered. In the 1990s the main goals will be a pronounced increase in the level of manufacturing technology, manufacturing process, and management, and the attainment of a certain standing for Chinese technology exports. The book does not, however, substantiate the feasibility of such goals.

As we have seen in the above, discussion by experts of socioeconomic development strategy in China, which has only just begun, has started with debate over the determining elements of development strategy. By 1982, there appeared many papers on this subject that pinpointed technology as the most important of the elements involved in formulation of development strategy.

### III. THE AVAILABLE OPTIONS IN AN AGE OF NEW TECHNOLOGICAL REVOLUTION

Since 1984 there has been publication of works in China on the "new technological revolution," the first such work having been Ma Hong's paper "Zhuazhu jihui, yingjie xin de jishu geming" [Seizing the opportunity for new technological revolution] [12]. According to Ma, such discussion in China of the "new technological revolution" has been triggered by a veritable flood of publications in the United States, Japan, and Europe on development and application of new technology, including information technology (microelectronics, optical fiber tech-

nology, etc.), biotechnology, technology for development of new materials, and new energy, ocean development technology, etc.; these publications have heralded "revolutionary" development of social productive capacity and new change in the life of society and individuals thanks to such new technology; and the taking in of such technology by China would contribute to retrieve a considerable degree of its economic and technological lag. Chinese discussion of the "new technological revolution" is in a way a part of the discussion on the subject of technology transfer strategy.

The Chinese publications on the "new technological revolution" can be divided into three main categories according to the specific aspects that they treat: (1) the posture that China should assume toward the situation in the advanced industrial countries with respect to development and application of the new technology; (2) the points of emphasis in use of the new technology by China; and (3) the schedule or program for making use of it.

In his above-mentioned paper Ma Hong cites three options that China has with respect to the posture it can assume, i.e., (1) disregarding the new technology and new industries arising in the advanced industrial countries as a phenomenon completely irrelevant to present conditions in China, (2) pursuing such new technology and industries indiscriminately, and (3) keeping an eye on the trends of development of the new technology and making ample use of it according to China's needs and possibilities, and maintains that the third such option is the one that China should take in line with its Marxist ideology. Furthermore, in his paper "Xin jishu geming he woguo gongye de jishu jinbu" [The new technological revolution and the technological progress of Chinese industry] [18], Yang Mu reminding his fellow countrymen of such slogans of the ill-fated "Great Leap Forward" of years back as "Catch up and overtake on all fronts!" and "Make our own complete (economic and technological) system!", advises them to recognize the lessons of that miserable failure and advocates selective adoption of goals and points of emphasis. What these two papers have in common is that both of them espouse selective application of the new technology, albeit Ma Hong presents his argument in rather vague terms.

On the other hand, Huan Xiang adamantly maintains in his paper, "Xin jishu geming yu woguo duice" [The new technological revolution and how China should react to it] [5], that China should set itself the strategic goal of attaining by the year 2000 the level of industrial and agricultural production and science and technology achieved by the most advanced countries of the world in the early eighties and reaching simultaneously the same level in some areas as those countries reach by the turn of the century and should refuse to consider any other course than an all-out effort to "catch up from behind." With the memory of the fiasco of the "Great Leap Forward" still in mind, however, he felt it necessary to qualify such "catching up" as taking into account China's present conditions and developmental needs and having an adequate planning, guidance, organizational and scientific foundation.

Next, let us consider two representative views regarding what points should be emphasized with regard to the use of the new technology by China. In

the above paper Huan Xiang cites microelectronics (including computers) as the best prospect for China and biotechnology as the second best. This is because, first, microelectronics, and particularly computers, unlike most other areas of the new technology, which have not yet gone beyond the experimental stage, is already in wide use and is exerting a considerable influence. Second, if China is able to achieve a solid foundation in that area, it will prove to be a considerable advantage in "catching up" in other areas as well and will provide the basis for adjustment and transformation of China's traditional industries. Third, it should be noted that China already has a certain foundation in biotechnology.

Another view on this subject is presented by Yang Mu in the same paper as mentioned above. Like Huan Xiang, he is of the opinion that the emphasis should be laid principally on microelectronics technology, at least for the time being. Furthermore, he identifies four conditions presently having a bearing on any efforts to improve China's industrial technology: (1) insufficient domestic and foreign capital; (2) mounting pressure for improvement of the quality of industrial products and for lowering their prices in a situation where competition among enterprises is now allowed; (3) mounting pressure in terms of rising cost of production of industrial products on account of rising prices for energy and raw materials and rising wages as a result of the policy adjustment by the central government; and (4) the need to shift the emphasis in the structure of exports from energy to industrial products in order to achieve expansion of exports. He thus also maintains that such conditions are providing motivation for improvement of the quality of industrial products and reducing consumption of energy and raw materials and that microelectronics technology, and particularly the applied technology of microequipment, is tailor-made for such purposes. At the same time, Yang Mu argues that it is necessary to emphasize one area of the new technology in preference to others, while admitting that the emphasis could shift in a few years to another area or other areas even though none can presently vie with microelectronics in terms of stimulation of the technological progress of Chinese industry.<sup>5</sup>

As for the third aspect of the "new technological revolution," i.e., the schedule or program for making use of the new technology, the paper mentioned above by Huan Xiang presents a sharply defined opinion on it. In it Huan gives the following analysis of the possibilities regarding acquisition and application of the new technology by China. He sees the future trends in the economies of the advanced Western countries excluding Japan for more than a decade as being: (1) very little likelihood of a resurgence of fixed capital investment and thus of large-scale replacement of plant and equipment; (2) impediment of rapid transformation of outdated technology by the risk of labor disputes; and (3) continuation of the situation in which rapid formation of extensive markets for the new technology is impossible owing to the contradiction in capitalist economies of furtherance of progress in science and technology on account of competition but

<sup>5</sup> Another paper that clearly identifies microelectronic technology as the new technology that should be emphasized is Yang Dexiang and Liu Tiemin [17].

hinderance of application of the new technology to production on account of the same factor, such hinderance outweighing such furtherance. He concludes that the market for application of new technology will continue to be a buyer's market for the most part and that this will work to the advantage of China in terms of its need to import the new technology. As for Japan, he expresses the view that although it will have the benefit of more favorable conditions than other advanced industrial countries over the short run, the same outlook for a market that is predominantly a buyer's market faces it as that facing the others. In the same paper Huan Xiang touches on the subject of the cycle of development of science and technology, saying that in spite of the fact that, historically viewed, the time it takes from scientific and technological invention to its application has been reduced, in a whole series of new technology not much time has yet elapsed since commencement of research, and most such new technology is still in the research or development stage. He therefore concludes that in view of the fact that China has a certain grounding with respect to the new technology, it will be able to catch up with the international level even if it starts only after a certain amount of time has gone by.

He proposes a ten-point plan for "catching up from behind." Of the ten points, three are worthy of note as representing new strategic ideas.

One such idea is that of constructing the Chinese version of "Silicon Valley" for the purpose of developing new technology and promoting its application on the largest-scale possible as an integrated entity for research and development, design, popularization, production, and home and foreign marketing of the new technology.

Another original idea suggested by him in connection with the possibilities of introduction of the new technology is that although the very latest technology cannot be bought, China should not have any trouble acquiring what is considered to be very up-to-date new technology in general. That is to say, in view of the tremendous speed of technological innovation in the world today it is possible to purchase good, up-to-date new technology that has come out only very recently.

His third original idea is that of making up for the insufficient number of trained personnel in China in the field of science and technology by having foreign personnel come to China in large numbers not just to work directly but also to help train Chinese personnel so that they can join the effort to develop new technology.

Of the writing on the subject of the "new technological revolution," "Xin jishu geming yu woguo zai guoji jishu maoyi zhong de diwei" [The new technological revolution and China's position with respect to international technology trade] [4] by Hu Jun and Zhang Bingshen, is a paper that treats the new technology transfer in strategic terms. It suggests four ways of improving China's disadvantaged position in international technology trade: (1) switching from traditional industry to industry that produces products based on the latest advanced, precision technology in the large industrial cities of the coastal areas; (2) switching from emphasis on hardware to emphasis on software in the structure of technology transfer and promotion of "digestion" of the technology involved in such transfer

and "return of service" by it; (3) further development of the "transit point" role of "special economic zones" and "economic and technological development zones" in technology trade (particularly utilization of the advantageous location of "economic and technological development zones" in the vicinity of large metropolitan areas for selective introduction of advanced technology on the basis, for instance, of licenses from multinational enterprises and for promotion of technology exports on the basis of joint production, joint research and in other ways); and (4) development of China's own intellectual resources with a view to expansion of software exports, particular exports of computer software.

As we have seen, the "new technological revolution" is being discussed in China with a certain degree of concreteness. However, there has not been enough discussion of the relationship between China's technology transfer strategy and its domestic socioeconomic development strategy and the possibilities and methods of introduction of new technology, which means that such topics as well will have to be treated in greater detail in the future.

#### IV. DISCUSSION OF THE ROLE OF "SPECIAL ECONOMIC ZONES" IN CHINA'S TECHNOLOGY TRANSFER

Since 1984 there has been publication of works treating the subject of the future of China's "special economic zones" (SEZs). That year saw the publication of several papers dealing with the theoretical problems involved in making the SEZs still more open to the outside in the context of general further development of China's policy of opening its doors at that time. Representative of them is Xu Dixin's "Guanyu jin yibu duiwai kaifang de ji ge wenti" [Some problems in opening China's doors wider to the outside world] [16]. That paper discusses three main topics: (1) establishment of enterprises in SEZs and similar "open cities" that are based on 100 per cent investment by foreign capital; (2) domestic marketing of products of joint ventures and 100 per cent foreign capital enterprises in SEZs and "open cities"; and (3) the economic models of SEZs and "open cities." The subject of technology transfer is touched on in topic (2).

Xu expresses the view that some marketing in China of products produced on the basis of advanced technology furnished by foreign capital interests should be allowed from the standpoint of reinforcing the effect of absorption of foreign capital and introduction of foreign technology by SEZs and "open cities" and stimulating improvement of quality and upgrading of the products of Chinese enterprises. In other words, he suggests that the SEZs should be geared to greater facility of introduction of advanced technology as opposed to the Chinese government's policy up to now of refusing to recognize domestic marketing of the products manufactured in them so as to have them serve the role of bases for earning foreign exchange.<sup>6</sup>

It can be surmised that Xu Dixin wrote that paper at the insistent request of

<sup>6</sup> Another paper that discusses the "special economic zones" and "open cities" from the same viewpoint is Ji Chongwei [8].

the Chinese authorities, who had made the decision to open China's doors wider and that, furthermore, the background of that decision was a sense of crisis prompted by the rapid progress being made by the advanced countries in development of new technology, the same motive as that for encouraging discussion of the "new technological revolution" as considered in the preceding section. Accordingly, discussion of the SEZs against such a background can be considered in a way to be discussion of strategic methodology with respect to technology transfer.

The year 1985 saw frequent publication of works dealing with the development strategy of "special economic zones," the contentions thereof falling roughly into the following two classifications.

Representative of the first viewpoint is Liu Guoguang's "Shenzhen tequ de fazhan zhanlüe mubiao" [Strategic development goals of the Shenzhen Special Economic Zone] [9], which sparked subsequent discussion on the development strategy of SEZs. The technique employed by that paper in order to demonstrate the validity of the author's views is comparison of several main views concerning (1) the development orientation of SEZs, (2) the industrial structure, and (3) the type of industry that should be encouraged to join such zones. First, with respect to the orientation of SEZs, he maintains that they should have an external orientation rather than an internal orientation or a dual orientation, the reason being that the purposes of their establishment are introduction of foreign capital and expansion of exports, both of which are characterized by an outward orientation. As for the industrial structure of SEZs, of the three choices—emphasis on agriculture, emphasis on manufacturing, and emphasis on trade—he opts for manufacturing because only in that case can the SEZs be expected to be able to fulfill their originally assigned mission of serving as "four-purpose receiving windows" for introduction of (1) funds, (2) technology, (3) management techniques, and (4) know-how as well as providing a basis for exports. Likewise, with respect to the type of industry to be encouraged in the SEZs, he says that the natural choice is the technology-and-know-how-intensive type rather than the labor-intensive type if they are to serve as "receiving windows." Although he characterizes the SEZs primarily in this way, nevertheless he advocates conjunction of manufacturing and trade and the construction of "comprehensive special economic zones" with a combination of financial, tourist, service, real-estate, agricultural, and other operations.<sup>7</sup>

Representative of the second viewpoint concerning the development strategy of SEZs is Huang Fangyi's paper "Dangqian woguo yinjin he duiwai jingji maoyi de zhiyue yinsu he gaijin shexiang" [Present limitations on China's technology transfer and foreign trade and a view as to what improvements can be made] [6], in which he maintains that now, when the SEZs are in transition from the stage of foundation to the stage of maturity, is the time to clearly define their character and orientation and discusses how both should be defined on the basis of what

<sup>7</sup> Among other articles that take the same stand as Liu Guoguang does here are He Fenghua [3] and Dai Yuanchen and Shen Liren [1].

has thus far been accomplished in terms of introduction of foreign capital. With regard to the character of the SEZs, he poses the question of whether they belong to the category of export processing zones or that of scientific industrial zones and concludes that there is no choice but to put them in the first category since analysis of what has been achieved so far in terms of introduction of foreign capital and technology shows that one can hardly expect much of them in terms of absorption and introduction of advanced technology. As for the orientation of the SEZs, he offers a clear-cut choice between an "inward" strategic orientation of import substitution and an "outward" strategic orientation, that is to say, an export orientation, and concludes that one has to take the "outward" export strategic orientation for granted considering the essence of the SEZs as export processing zones. Therefore he sees the main purpose of the SEZs as being the earning of foreign exchange through exports, sets the elements of their industrial structure in the descending order of (1) trade, (2) manufacturing, and (3) agriculture, and points to the large metropolises as being better equipped to serve as the receiving end of technology transfer involving "sophisticated, precision, and vanguard" technology than the SEZs.

Let us put the differences between these two views concerning the development strategy of SEZs as represented by the two cited papers in sharper focus. On the one hand, Liu Guoguang's paper, which only specifically considers the Shenzhen Special Economic Zones, defines an "outward" development orientation as having two aspects, that of introduction of foreign capital and that of exports and also emphasizes introduction of advanced technology, advocating the welcoming mainly of manufacturing industry that is technology and know-how intensive since such zones are meant to serve as "receiving windows." Moreover, in spite of stressing such strategic goals, it nevertheless advocates the formation of "comprehensive special economic zones." On the other hand, Huang Fangyi's paper defines an "outward" development orientation as being synonymous with an "export" development orientation and maintains that the SEZs should concentrate on earning foreign exchange instead of introducing advanced technology and become specialized as export processing zones.<sup>8</sup>

In spite of the fact that the SEZs are going concerns, their development strategy has not been defined. The reason is that they were originally established by socialist China as experimental bases for introduction of funds and technology from capitalist countries to be operated on a trial-and-error basis and that policy has not yet changed. Nevertheless, despite trial and error, introduction of advanced technology by the SEZs has not progressed as much as China expected it would. Hence occurrence of the debate over the development strategy of such zones since 1985, a debate which has been specifically based on their present

<sup>8</sup> However, in addition to such debate, a development policy oriented toward an outward-looking economy as espoused by Liu Guoguang was adopted for the Seventh Five-Year Plan period (1986-90) at the National Working Conference of Special Economic Zones held in late December 1985 and early January 1986, the items of such policy being stepped-up introduction of foreign funds and advanced technology and promotion of exports.

conditions. Thus, neither of the papers mentioned in this section discuss the socioeconomic development strategy or technology transfer strategy of China as a whole, but rather both limit themselves to the SEZs. Huang Fangyi's paper advocates specialization of such zones as export processing zones for the purpose of earning foreign exchange and disregarding them in connection with "domestic" socioeconomic development strategy. On the other hand, Liu Guoguang's paper assigns them the role of "receiving windows" for introduction of technology into China but fails to discuss how they relate to domestic development strategy. This is something that remains to be clarified.

### CONCLUSION

In the present paper several topics of recent discussion in China of that country's technology transfer were selected, and the salient features of strategic arguments on the subject were presented in terms of papers considered to be representative of them. All of the papers described were in agreement on the following points:

- (1) Technological innovation is the most important element in development of production.
- (2) Introduction of the latest advanced technology should be accomplished by all available means.
- (3) In introducing technology for technology-intensive industry, priority should be given to technology that China needs and that can be absorbed by it.

The following are the points in the above arguments that outsiders would not consider to be very well defined:

- (1) What kinds of technology-intensive industry should be given the highest priority in technology transfer? Will the technology introduced be only the kind that will serve as a model, the goal being technology import substitution? Or will large quantities of technology with the same specifications be imported for the sake of economy?
- (2) What will be the percentage breakdown in technology transfer between the most advanced technology and technology for transformation of existing enterprises?
- (3) Is there disagreement concerning how the "special economic zones" and "open cities" should be made to function as points of introduction of technology and its dissemination throughout the country?

As we have already noted, since the establishment of the People's Republic China has consistently striven to achieve introduction of advanced technology and technology import substitution. Since the early eighties it has added the technological transformation policy line and introduction of software to that consistent policy line. During the first half of the Seventh Five-Year Plan period the emphasis can be expected to be placed on the technological transformation policy line and introduction of software, but observers think it very likely that the policy of introduction of large-scale plants in large quantities will be revived by the nineties for the Eighth Five-Year Plan.

## REFERENCES

1. DAI YUANCHEN, and SHEN LIREN. "Guanyu shenzhen jingji tequ fazhan zhanlüe de tantao" [A study of the development of the Shenzhen Special Economic Zone], *Renmin ribao*, December 13, 1985.
2. GAO DICHEN; WANG BAOCHEN; and CHEN JIAQIN. "Guanyu woguo duiwai jingji huodong de fazhan zhanlüe" [The development strategy of Chinese foreign economic activity], *Caimao jingji*, 1982, No. 5.
3. HE FENGHUA. "Shenzhen tequ fazhan waixiang xing jingji de wenti" [The question of outward economic development in the Shenzhen Special Economic Zone], *Jingji ribao*, September 16, 1985.
4. HU JUN, and ZHANG BINGSHEN. "Xin jishu geming yu woguo zai guoji jishu maoyi zhong de diwei" [The new technological revolution and China's position with respect to international technology trade], *Guoji maoyi*, 1985, No. 6.
5. HUAN XIANG. "Xin jishu geming yu woguo duice" [The new technological revolution and how China should react to it], *Zhongguo shehui kexue*, 1984, No. 4.
6. HUANG FANGYI. "Dangqian woguo yinjin he duiwai jingji maoyi de zhiyue yinsu he gaijin shexiang" [Present limitations on China's technology transfer and foreign trade and a view as to what improvements can be made], *Jingji yanjiu*, 1985, No. 12.
7. HUANG WEN. "Jishu xuanze yu jingji fazhan" [Economic development and choice of technology], *Ganjiang jingji*, 1982, No. 10.
8. JI CHONGWEI. "Woguo duiwai kaifang zhengce de lilun he shijian" [The theory and practice of China's open policy to the outside], *Jingji yanjiu*, 1984, No. 11.
9. LIU GUOGUANG. "Shenzhen tequ de fazhan zhanlüe mubiao" [Strategic development goals of the Shenzhen Special Economic Zone], *Renmin ribao* (foreign edition), August 12, 1985.
10. MA HONG. "Guanyu jishu jinbu wenti" [On the question of technological progress], in *Tansuo jingji jianshe zhi lu* [In quest of economic construction] (Shanghai: Shanghai-renmin-chubanshe, 1984).
11. ————. "Guanyu shixian zhanlüe mubiao de buzhou wenti" [The question of the procedure to be followed for achievement of strategic goals], *Renmin ribao*, October 28, 1982.
12. ————. "Zhuazhu jihui, yingjie xin de jishu geming" [Seizing the opportunity for new technological revolution], *Hongqi*, 1984, No. 6.
13. SUN SHANGQING. "Guanyu woguo jingji fazhan zhanlüe wenti de renshi" [Perception of the question of China's socioeconomic development strategy], *Renmin ribao*, April 12, 1982.
14. ————. "Shilun jishu gaizao wenti" [Essay on the question of technological transformation], *Jingji yanjiu*, 1982, No. 2.
15. SUN YAFANG. "Ershi-nian fan liang fan bu jin you zhengji baozheng erqie you jishu jingji baozheng" [A four-fold increase in twenty years has not only political assurance but also technological and economic assurance], *Renmin ribao*, November 19, 1982.
16. XU DIXIN. "Guanyu jin yibu duiwai kaifang de ji ge wenti" [Some problems in opening China's doors wider to the outside world], *Renmin ribao*, May 22, 1984.
17. YANG DEXIANG, and LIU TIEMIN. "Qiantan xin jishu geming yu woguo gongye qiye de jishu gaizao" [A brief discussion of the new technological revolution and technological transformation of China's industrial enterprises], *Jingji guanli*, 1985, No. 9.
18. YANG MU. "Xin jishu geming he woguo gongye de jishu jinbu" [The new technological revolution and the technological progress of Chinese industry], *Jingji yanjiu*, 1984, No. 9.
19. YU GUANGYUAN. "Guanyu zhongguo shehuizhuyi jingji, shehui fazhan zhanlüe wenti de kexue yanjiu" [Scientific research on the question of socioeconomic development strategy of China's socialism], in *Jingji-shehui fazhan zhanlüe* [Socioeconomic development strategy] (Beijing: Zhongguo-shehui-kexue-chubanshe, 1984).