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# **The State of the Art and Perspective of Information Systems in China**

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## **I. The State of the Art of IS in China**

China started developing computer-based information systems in the late of the 1970's. In this preliminary stage of IS development, some simple data processing systems were implemented for payroll management and other statistic purposes using some Chinese-made computers like DJS-108 and DJS-130. Some large, government-run enterprises also introduced large and middle sizes computers as well as some software like COPICS from developed countries to develop their own information systems. However, the IS development in this stage was greatly limited by the high investment expense, expensive equipment as well as a lack of means of Chinese information processing.

Along with the great social economic development since early 1980's, micro computers have widely spread in China. The difficulty of Chinese characters processing had been overcome with the emergence of CCDOS in early 1980's. This technique definitely wiped out the technical obstacle of computerization movement in China. To enhance computer industry, the Chinese government set up many privileged policies, such as heavy finance supports, to support computer applications in country's economic developments. In addition, the Chinese government also set up progress in computerized systems development as a criterion when evaluating government-run enterprises. The implementation of these policies had proved efficient and appropriate to IS development in China during this period. Consequently in the middle of the 1980's there was the first peak of wave of IS development in china. Nowadays, after efforts of dozen years, China has gained great achievements in IS development and established a good starting pointing for further developments. Some of these achievements are as follows:

1. In the end of the 1980's, the Chinese government invested more than 20 billions yuan (around 3 billions USD) to develop 12 National Information Systems for important industry sectors, such as banks, posts and telecoms, electricity systems, railways, civil aviation, customs, meteorology observatories and population investigations. These large and high technology systems have been playing very important roles in country's economy:

The National Banking System, based on satellites communication systems, provides an efficient nation wide network for routine banking operations, service management and decision making procedures.

The Railway Transport Management System provides the automation of trains scheduling and transport management.

2. Importance of information to social development has already become a common concept in part of the Chinese society. Through practice of dozen years in IS development, both managers and technical professionals have recognized the importance and difficulties of developing information systems in enterprises. Moreover, with the wide spread concept of information in China, more and more young people have been involved and/or will participate in the information technology industry. Today, there are more than one hundred tertiary institutions providing courses in Information Systems Management. Computer application and its related courses have become the hottest courses in China.

3. The number IS professionals has increased dramatically in China recently. According to statistics, up to today, ninety percent of firms have already used computers to handle routine operations, and even built up their own information systems to different extents. Consequently, numerous IS professionals have been generated by the developments of these information systems. For example, 35,000 people have been trained by the development of banking system. China has around 400,000 IS professionals working in system software developments and computer application developments.

4. IS development in China has promoted the quality of management in Chinese enterprises. High qualified management of a company is the necessary condition for successful development of an information system. On the other hand, the development of this system will enhance the management of the company, making the management more scientific, reasonable and complete. This has been proved by many instances.

We may conclude that IS developments have gained a great success in China. Millions of computers have been used in most areas, 70% of them serve to aid decision making at different levels of administration. However, extent of success of these running systems varies dramatically among different regions and sectors of industry. Though some systems were technically very successful and have significantly boosted productivity of the companies involved, some systems are much less beneficial to the enterprises. Some Enterprises may just use computers as typewriters. The weaknesses of IS developments in China can be summarized as follows:

1. Many existing computerized systems are so-called "simple" systems. They can only support single routine activity at operational levels by replacing some low level, repeated manual operations. Few of them are involved in the high-level activities of enterprises, such as predicting, decision-making and optimizing activities. These kinds of large and complicated systems are relatively rare in China.

2. Very few generic application systems have been commercialized in the market. Many systems are strongly coupled with particular applications. Developments of these systems had proved to be time and money consuming. These systems have high maintenance costs and rarely can be reused for different applications.

3. The emphasis of development policy was mainly put on developments of new systems, rather than on reuse and maintenance of currently used systems. It's common practice that people value hardware more than software and focus more on developments of new systems rather than on maintenance of running systems.

## **II. Perspectives and Recommendations**

Today, IS development in China is moving from the first stage, characterized by small-sized, single application systems, to the second stage, characterized by large-sized and networks-based systems. This change is leading to new development philosophy of Chinese industry, which is marked by a new term, "computerization" rather than "mechanization" before the 1980's. Although a lot of out-of-date enterprises need to be upgraded and restructured, the Chinese economic development strategies have already emphasized heavily on the information technology industry. This will match well a world-wide concept "Information Superhighway" and make China capture the train. In fact, in China, most of manufacturing control systems have been incorporated with new-developed information systems. Many of these combined systems have also been linked by national-wide information networks. Three information technology national projects which were launched in 1993 have greatly boosted Chinese information systems developments. These three projects are so-called "Three-Gold-Projects", consisting of Golden-Bridge Project, Golden-Card Project and Golden-Custom Project. The Golden-Bridge Project is to build a national-wide network providing public-accessible economic data. The Golden-Card project is to build national wide ATM systems while the Golden-Custom project is targeted at interchange of national foreign trade data. Moreover, the Chinese government has also proposed a plan for other national information systems developments projects, like "Golden-Taxation Project", "Golden-Agriculture Project" and so fourth. The realization of these projects will make a revolutionary change on Chinese information technology

developments. According to an estimate of the Chinese government, by the year 2000, office automation will be implemented in most of the administrations and more than 5000 large enterprises will have computerized management systems while hundreds of them will implement CIM systems. China will move from an agriculture-based country to an information-based country by that time.

With regard to recommendations, the authors believe that some factors should be taken into account by the Chinese government to further information systems development in China.

1. Public recognition of importance of information for the country's development is a crucial factor. Lack of wide support for information systems development has been believed to be the main cause of the failures of many information systems in China.

2. Chinese characteristics can also determine the fate of information systems. Development experience in foreign countries must be tailored to the local situation. Many Chinese-specific characteristics, such as politics, culture, economic development level, and so forth play a very important role in Chinese information systems development.

3. New system development methodologies covering the whole the system development life cycle need to be explored. Information system developments should not been treated only as implementations of technologies. They are actually very complicated society-related processes. However, the methodologies that are currently used in China are basically technical-oriented, ignoring human participation in information systems. In the middle of the 70s, Checkland proposed the theory of Soft System Methodology to handle society-related factors in information systems developments. However, very little attention has been paid to this issue in China.

4. CASE tool research and development should be also enhanced in China to promote the productivity of information system developments. Although enterprises in different areas have their specific characteristics and different requirements for information systems, they do share many identical functions and structures and expect many common services from information systems. A CASE tool used in a particular application may be directly used by other different systems with few modifications. Up to now, information system development in China is still labor-intensive. Very few CASE tools have been worked out. This has led to poor productivity and efficiency of system developments. What is more, many existing systems are also very difficult to maintain in accordance with new environment.

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