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Logistics Education & Research in China

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Abstract

China's modern logistics have been developing fast since their beginning in the mid-1990's, especially after the country entered the World Trade Organization. They are now entering a rational, practical and quick-developing period consistent with China's persistent and rapidly developing economy, its economic structure adjustment, and the maturity of its information and cyber technology. Educational programs in logistics in China, which include material management, transportation management, and so on, date back to 50 years ago. Modern logistics education began in late 1980s & quickly developed during the 1990s. Now, China has over 160 colleges and universities that offer bachelor degrees in logistics and over 450 institutions that provide professional training programs in logistics. Logistics research in China, which includes planning, management, technology & operation, is emphasized both by the government & private enterprise. However, trans-industrial and trans-domain research is severely lacking. SJTU is one of leading universities in logistics research.

Key Words: Logistics industry, logistics education, logistics research, SCM

PART 1. The Logistics Industry in China

Logistics industry, especially the third party logistics (TPL) industry, is the inevitable product of the development of a certain extent of social productivity under progressing economic globalization, with more multinational corporations emerging and international trade competition becoming more intense.

China's modern logistics have been developing fast since their beginning in the mid-1990's, especially after the country entered the World Trade Organization. They are now entering a rational, practical and quick-developing period consistent with China's persistent and rapidly developing economy, its economic structure adjustment, and the maturity of its information and cyber technology.

This can be shown mainly as follows:

1. *The social demand for logistics is increasing rapidly and continuously. Meanwhile, the proportional cost of the social logistics as a fraction of the GDP is reducing steadily and the increasing value in the logistics industry is rising steadily.*

Since China opened to the outside world, the annual average increase of its national economy has stayed consistently at 9.3%. In 2004, its GDP amounted to $1,611.76 billion, and the total volume of its import and export trade reached $1,154.74 billion. The total volume of transport cargo for the whole society is 16.1 billion tons. The total value of the logistics industry was up to 38,400 billion yuan in 2004 (double than it was in 2001), occu-

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pying 21.3% of GDP. The proportional cost of social logistics as a fraction of the GDP is decreasing smoothly according to the proportional changes these years. Modern logistics has become a key industry of China's service industry and a new growth field of its national economy.

2. *Various logistics companies are developing quickly, and management and service innovation in logistics is coming into a new phase.*

China's logistics market consists of many powerful groups of logistics enterprises that have different systems of ownership and different operating scales and service patterns. They can be divided into three types as follows:

（1） State-owned-origin logistics enterprises（the traditional transport and storage companies）. With their system restructuring and business changing to modern logistics, enterprises such as COSCO and CSC have become the backbone of China's logistics market.

（2） Privately-owned businesses that have strength and large incomes, such as P.G. LOGISTICS GROUP CO., LTD; TRANSFAR CHEMICAL GROUP CO., LTD; and Tianjin DTW GROUP CO., LTD.

（3） A large amount of foreign and oversea logistics companies, especially some world famous multinational enterprises, that have entered China's markets. Examples include MAERSK（Denmark）, APL（America）, FedEx（America）, Exel（British, now reformed）, Nippon Express（Japan）, Hutchison Whampoa Limited（Hong Kong）, Kerry Logistics（Hong Kong）, Evergreen（Taiwan）and T. Join（BVI）Logistics（Taiwan）. These companies bring new ideas, technologies and management patterns for China's modern logistics industry.

In addition to the rapid development of logistics enterprises, some innovative modes like bonded parks have also emerged.

3. *Logistics infrastructure, facilities and technology have been developed rapidly.*

In recent years, China's transportation facilities have been upgraded rapidly and comprehensive transporting systems have been improving gradually. By 2004, there were 74,000 km of national railways transportation and 1,870,000 km of roads. Also, 34,300 km of expressways have been put into use. There are 830 deepwater berths which can handle vessels above 10,000 DWT, and of these, 155 are container terminals. There are 7 ports whose handling capacity has exceeded 100 million tons and the national container throughput was 61.5 million TEU in 2004.

Hubs of different modes of transportation have been improved greatly, and the construction of comprehensive mode hubs is under progress. A variety of logistics parks, logistics centers and distribution centers has developed quickly. Equipment and facilities such as tiered warehouses and automatic sorting and picking up devices have been well-developed, and the popular application of the Internet has offered essential technical conditions for the informationization of logistics.

4. *The acceleration of the informationization of logistics propels the modernization of China's logistics industry.*

Many departments and local governments attach importance to informationization and take it into account in the construction plan and budget.

First of all, the building of a logistics information platform has come to a new stage. For example, the Ministry of Railways, the Ministry of Communications, the Customs House, and

the Civil Aviation Administrative Bureau have emphasized platform construction and have cooperated with each other in order to exploit extranet communication platforms and public information service platforms, facilitating information sharing.

Local governments have begun to set up high efficiency logistics information networks, improving the efficiency of customs declarations and distribution.

Secondly, the focus of enterprises on building information systems accelerates the establishment, upgrade, and reform of supply chain management systems.

Many logistics companies have placed value on strengthening specialized logistics services, creating many successful supply chain management systems for products such as steel, cars, pharmaceuticals, wine, tobacco and electronic devices.

5. *The groundwork of logistics has been set, and the modern logistics industry has evolved gradually.*

This can be shown as follows:

（1） A project of logistics standardization has begun.

The government, together with logistics associations, is drafting ***The Development Plan for National Logistics Standardization from 2005 to 2010.***

（2） Logistics statistical regulations have been established.

Beginning this year, statistical data will be published annually for convenience of analyzing the development of the modern logistics industry and improving logistics planning and policy.

（3） Education and training in logistics have been greatly improved.

6. *The whole society has begun to recognize modern logistics and has tried to apply its methods of management, especially in the manufacturing industry and commercial corporations. This promotes the integration of resources and creates a foundation for expanding the logistics market.*

Manufacturing companies have started to accept idea of modern logistics. They are emphasizing its application and changing current operation processes to PO-centered ones. They are integrating the processes of raw material purchasing, production organization, transportation, stocking and selling. They are outsourcing non-core competitive businesses, and this has largely shortened the period of turnover for liquid funds and has raised the competitive power of the companies and their products. Some of the companies have decreased the amount of their staff in order to reduce logistics costs. Manufacturing corporations have gradually realized the advantage of logistics outsourcing.

Also, commercial corporations have sped up the restructuring of businesses. They have developed modern methods of logistics like shop chains, unified distribution and E-commerce. In recent years, the sale growth rates of shop chains are over 30%. This development has changed the companies' production modes and operation modes and people's living and consuming habits, breaking the traditional way of having the company operate all the business logistics itself.

Although China's logistics industry has made much progress, it is still in its infancy, and the following problems are evident:

（1） The whole society's understanding of modern logistics concepts is not widespread. Meanwhile, the level of logistics services and management is low. In the demand aspect, manufacturing and commercial enterprises are constricted by the traditional central planning economic concept that the company should be complete and self-centered, and this hinders the transformation of the huge amount of

potential needs in logistics into effective market needs. Regarding the supply side, the problems of small scale, dispersion, and bad management seriously trouble logistics companies so that their operation mode, service quality and the efficiency cannot meet the needs of a socialized logistics industry.

（2） Logistics infrastructure facilities are weak. The lack of comprehensiveness and compatibility as well as the limited ability make it hard to satisfy growth needs.

（3） The organization and layout of logistics are not realistic. The function division, regional containment, and industry monopolization adversely affect the concordance and integration of the logistics resources.

（4） China's logistics industry still lacks consolidation, completeness, and harmony with industrial policy, which are important for the development of the logistics industry.

The Chinese government is seriously considering the development of the logistics industry, and many departments have gotten involved in the modern logistics industry. In August 2004 with approval by the State Council, nine concerned ministries and commissions jointly issued ***Opinions on Promoting the Development of China's Modern Logistics Industry,*** in which a series of policies and measures to promote the development of China's modern logistics are brought forward in the aspects such as marketing entrance permissions, taxes, development environment and organization, and operations. This was done to coordinate the policies and measures issued by different ministries and commissions and to move the industry's development forward. In February 2005, the Joint Conference for Modern Logistics was formally established, which was initiated by the National Development and Reform Commission（NDRC）and is composed of 13 ministries and commissions and 2 professional committees. Its purpose is researching the developing trends and existing problems of China's logistics on a regular basis, suggesting solutions and supervising several different departments. The Conference creates strength and unity by leading the development of modern logistics. In September 2005, another meeting, the National Logistics Meeting, was held. From the above, one can conclude that the logistics industry will develop more rapidly in a healthy way.

The national government has presented general objectives for developing the modern logistics industry based on scientific development principles, guided by the marketing trends, and supported by modern information technology. This was done in order to construct a policy environment for modern logistics development, establish a highly efficient and complete modern logistics service system, develop professional and socialized logistics enterprises, improve logistics service quality and efficiency, cut social logistics costs, promote the upgrading and restructuring of the industry, and offer relevant guarantees in logistics for the nation's economy and society's prosperity.

The goal of modern logistics development during China's 11th Five-Year-Plan is that the basics of a quick, highly efficient, safe, convenient, and competitive modern logistics service system should be established by 2010 and that the level of logistics socialization, specialization, and modernization should be increased greatly. Also, the percentage of the total cost of logistics in GDP should be reduced by 2% to 3% compared to 2004, in which it was 21.3%.

PART 2. Logistics Education in China

Modern logistics theories are based upon economics, management sciences and

operational research with an effective integration of advanced information technologies. Therefore, economics, management science, operations research, and information technology are the foundation of modern logistics management. Educational programs in logistics date back to some 50 years ago in China. Examples of early programs include materials management, transportation management, post & telecommunication management, oil and natural gas supply technology, and so on. However, because of the planned economy system and overall economic situation in China, modern logistics education didn't become a reality until quite recently. It is in the late 1980s when some of the concepts and ideas of modern logistics were seen in the classroom. Since the 1990s, educational programs designed for modern logistics training have developed rapidly. Currently, China has over 160 colleges and universities that offer bachelor degree in logistics and over 450 institutions that provide professional training programs in logistics. A good variety of training programs and qualification and certification programs have also emerged at a dazzling speed. Some professional and industrial associations have joined hands with foreign organizations to promote qualification and certification systems in China. In 2003 with the approval from the Ministry of Education, the Master of Engineering in logistics field program was officially launched. Logistics education in China has thus entered a fast-growth period.

1. *Current Status of Logistics Talents in China*

With a mushrooming demand for logistics talents, China is facing a huge gap in terms of the number of logistics professionals, who have become one of the twelve most sought after groups in the job market. A preliminary estimate shows that by 2010 the demand for logistics professionals with associate degree or above will reach 300,000 to 400,000 and 1 to 2 million employees will need on the job training. Yet currently, higher education institutions in China have only an enrollment of less than 10,000 students in logistics programs each year, and the annual on-the-job training capacity is about 50,000 persons. The gap is obviously huge. Regarding the educational level of employees, only 7.5% of workforce in China's logistics industry have had a junior college education or above. Moreover, outdated knowledge and lack of creativity are the norm in this industry. According to a report from the University of New Orleans in the U.S., 41% of the American logistics managers surveyed have Master degrees; 92% are Bachelor degree holders; and 22% have official qualifications or certifications. In terms of talent structure, middle and high-level professionals with global perspectives in the areas of logistics planning, consulting, and research, are desperately needed, while the demand for average operating staff is relatively saturated.

2. *Channels for the Training of Logistics Talents*

The training of logistics talents in China is carried out through three major channels:

Educational Organizations. Currently many institutions of higher education offer logistics courses and logistics programs. Quite a few universities have set up a department of logistics engineering and management. According to statistics from the 4th Symposium on the Teaching of Modern Logistics in Chinese Universities, held in Chengdu in 2004, the number of universities with such a department was actually over 200. These universities serve as the primary channel for high-level training in logistics. With a green light from the Ministry of Education in 2003 to launch the Master Degree programs in logistics engineering, training was moving toward a higher level. Today, Shanghai Jiao Tong University alone has over 200 students enrolled in Master Degree programs in logistics engineering. In addition, each year tens of thousands of students from over 450 professional training institutions fill positions of middle-level management or join the operating staff in the logistics industry.

Training Programs Sponsored by Governmental Organizations. In order to address the needs of enterprises, in 2002 the China Logistics Alliance Network and the Ministry of Labor and Social Security started to formulate training plans and lay out qualification requirements for professionals in transportation and logistics. By now the qualification requirements and training materials have been finalized and approved by government authorities. The training programs and relevant exams for the Certified Engineer and Associate Engineer in Transportation and Logistics are provided nation wide, and tailored on-the-job training programs are also available.

Meanwhile, collaboration with professional logistics training organizations in developed countries as an effective way to integrate global perspectives into training programs has received increasing attention. In 2002, the China Communications and Transportation Association and the Chartered Institute of Logistics and Transport（UK）signed an agreement to introduce a comprehensive qualifications program in logistics and transport in China. In 2003, the CTL Certification program from the American Society of Transportation and Logistics（AST & L）was also brought to China.

Short-term Corporate Training Programs. Even though it is beyond the capability of formal educational organizations to address the urgent needs of training for logistics professionals, some enterprises increasingly seek to work with colleges, universities and professional qualification assessment organizations to design training programs tailored to the needs of individual companies.

3. *Major Challenges in China's Logistics Education*

Given its late start in adopting modern logistics concepts and its relatively short history of development, logistics education in China faces daunting challenges in the following areas:

Faculty development is lagging behind, and academic communities in general lack the ability to carry out in-depth studies. When it comes to logistics education and training, the first issue to tackle is deficiency in basic research and faculty development. China has had a late start in logistics education, and existing programs are not equipped with sophisticated theories. In most cases, theoretical frameworks are imported from studies in other countries, and a comprehensive theoretical framework featuring business practices in China has yet to be developed. Moreover, most logistics faculty members used to work in other fields such as computer science, management science, and transportation technology, and they lack adequate training in logistics. The situation is further complicated by the fact that most faculty members have little or very limited hands-on experience in logistics, therefore teaching has become quite a stretch for them. Even considering these facts, there is still a shortage of faculty members to teach all the courses required in logistics programs. As for academic research in logistics, people place too much emphasis on introducing new concepts. Logistics research and teaching in China is still in its infancy. There are very few people who are truly devoted to basic research in modern logistics, and the overall quality of academic research in logistics remains at a relatively low level. Almost all of the well-received teaching materials are from foreign sources.

There is a lack of connections between classroom teaching and real world application. Logistics is a discipline featuring a strong link between theory and practice. Due to the late start in logistics education as well as inadequate teaching facilities, courses are designed in a way that a disproportionate amount of time is spent on teaching logistics theories. Real-world related issues are seldom touched upon in teaching, resulting in a disconnection between theory and reality. As a result of these factors, graduates from these programs generally don't have a deep understanding of logistics theories; in addition, their skills in handling

real-life issues leave a lot to be desired.

Teaching methods are outdated. Teaching methods are an indispensable part to any educational process. Modern logistics is an emerging discipline that integrates a good variety of knowledge, and thus calls for new processes and methods in teaching. Currently "cramming" and "spoon-feeding" are still the prevalent ways of teaching in China. While teachers try to impart knowledge through such methods, what students in logistics programs need more is the ability to solve complex issues in life. Therefore, it is far more important to bring into full play the students' initiatives and help students develop a comprehensive skill set and the ability to think creatively.

4. *Developing Strategy of Logistics Education in China*

Compared with programs in developed countries, logistics education in China still has a long way to go. Learning from the experiences of other countries and accelerating the development of logistics education in China has become a top priority.

In the 1980s, developed countries started to integrate logistics programs such as logistics management and supply chain management into their higher-education systems. Today they have developed a comprehensive and advanced-level education system in logistics. According to the Council of Logistics Management（now CSCMP: Council of SC Management Professionals）in the U.S., there were altogether over 180 institutions of higher education in the U.S., Europe, and Asia that offered logistics programs in 1997. Conferences on logistics education are held annually in Europe. The statistics from Logistics Education 2000 in Europe show that the number of European universities with logistics programs had reached 87; among those 54 were offering Bachelor Degree programs（1/3）or Master Degree programs（2/3）in logistics management or supply chain management. Some European universities are also the home of world's leading logistics research centers such as the Supply Chain Research Center at Cranfield University. The Cranfield School of Management and the Cardiff Business School in Britain, the Bordeaux Business School in France, the University of Koeln in Germany, the University of Bourgogne in Italy, the Stockholm School of Economics in Sweden, the Copenhagen Business School in Denmark, Erasmus University in Netherlands, and Athens University of Patras in Greece all offer logistics programs and have made great achievements in logistics research. Currently in the U.S., there are over 10 major industry organizations and research institutes involved in logistics, including the CSCMP, the Society of Logistics Engineers and the Warehousing Education and Research Council. About 50 universities in the U.S., including Georgia Institute of Technology, Harvard University, the Wharton School of the University of Pennsylvania, the MIT Sloan School of Management, Pennsylvania State University and Miami University, offer programs in logistics management or supply chain management where students can choose any of three degree programs（Bachelor, Master and Ph.D.）. Bachelor Degree programs in logistics management are also available in many prestigious Japanese universities such as Waseda University and Ryutsu Keizai University. Moreover, in these countries, various associations in the logistics industry sponsor and organize a wide range of informal training, and vocational education has made steady headway. The regulations in these countries stipulate that professionals in logistics industry should go through relevant training and receive professional certification before employment. Such an educational system featuring both formal education and informal training provides a sound structure for developing a logistics talent pool that can meet the diverse needs of the industry.

The development of modern logistics industry in China calls on us to learn from other countries and take these actions to improve logistics education:

First, strengthen faculty development in logistics programs. Most university teachers in Chinese logistics programs used to work in related fields such as economics, management science, mechanical engineering, transportation technology, and material management. There is much room for improvement both qualitatively and quantitatively in the faculty of logistics programs. Therefore, it is imperative to improve the situation through various approaches, including sending faculty members abroad to further their study, providing them with opportunities to work in large logistics enterprises, and inviting foreign experts or senior executives in the logistics industry to give lectures in China.

Second, the latest developments in the logistics industry must be integrated into the program, and practical training and case study methods should play a bigger role in the teaching process. To ensure quality teaching, carefully prepared, well-designed and broadly applied teaching materials must be available. At present, well-written teaching materials for foundational courses as well as core courses are desperately needed. One solution is for the government authorities to organize a team of experts to compile logistics textbooks that reflect business situations in China. For the moment, it is advisable to introduce high-quality textbooks from abroad as well as the advanced theories and latest developments in the field. New content based on the actual situation of China can be added. Meanwhile, Chinese educators should work on the improvement of practical skills and case studies, coupled with the use of audio-visual net technology and multi-media technology so that logistics knowledge will be disseminated and updated more effectively in China.

Third, strengthen the link between academia and industry. The logistics study is a relatively new subject area which is closely related with practical work experience. Therefore, it is important that the students have ample chances to do field work in order to acquire hands-on knowledge in logistics. As an applied science, support from industry is vital in the development of logistics study. On the other hand, intellectual and technological support from universities in terms of new technology and new approaches is pivotal to the improvement of logistics in the corporate world. This highly interdependent nature will help drive an interactive relationship between universities and industry.

Fourth, strengthen cooperation with universities around the world in order to improve the quality of logistics education in China. Logistics is a relatively new subject which is developing very fast. Drawing on the experience of advanced countries in logistics education in order to improve China's educational programs will narrow the gap between China and those advanced countries in this field in the shortest possible time. As a result, more talented professionals will be educated more efficiently and effectively. With the support from the National Development and Reform Commission, the Ministry of Communications, the Shanghai Municipal Government, the US Department of Commerce, and the State Government of Georgia, the Sino-US Logistics Forum 2005 jointly organized by Shanghai Jiao Tong University and Georgia Institute of Technology was held on October 20, 2005. During the forum, the Sino-US Global Logistics Institute was officially set up. After the forum, the Sino-US Joint Master Degree program in logistics engineering and management was launched. The 2 to 2.5 year program includes teaching activities conducted in Shanghai and Atlanta, internship, and field trips in transnational companies in the US, Europe, and Asia. This program is designed to nurture top notch talent with global perspectives and operational expertise for China and the Asian Pacific region as a whole.