

NEW CHALLENGES FOR CHINA INSTITUTE OF METROLOGY

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Abstract: Chain Institute of Metrology (CIM) is a special college multiply supervised by the State Bureau of Quality and Technical Supervision (SBQTS) and the State Education Ministry. In this paper, The background of CIM is briefly described first Then the new strategic challenges for CIM are presented, which is not only related to the development of science and technological in the coming new century, but also to the further open police and economy reforming of China. Facing the new strategic challenges, CIM must modify its instruction ideas and its relationship with enterprises and corporations, find more supports from SBQTS, SEM and the local government of Zhejiang province, build a wide cooperation relationship with the international, and do its best to gear its education and training program, featured in the characteristics in the metrology and quality management, to the development of the national economy

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1 INTRODUCTION

Two thousand years ago, Emperor Qing not only unified the whole country of China but also its weights and measures, which made an important contribution to the development of ancient China. When China began its new economic development there was an urgent request for human resources who work in the national infrastructure of metrology and the enterprise's quality system. China Institute of Metrology (CIM) was founded in 1985 on the base of Hangzhou Metrology School, which began in 1978. The guiding principle of CIM is to become a higher education institution in engineering, management and law, featured in the areas of metrology, standardization, quality management, quality inspection and technical supervision. More than twenty years have passed, up to July 1999, more than 8,000 full-time students for Bachelor Degree and higher education program, nearly 4,000 correspondence or in-service training students have graduated from CIM. The enrollees came from all over China and most of the graduates now work in the metrological infrastructure of China. Presently in CIM there are six departments, more than 600 faculty members, one fundamental science institute and one adult education school. When the new century coming, the world and the national economic situation has been changed so much that CIM not only faces the dramatic progress of scientific and technology, but also the education ideas and training methods, and especially the system reform of China. The more challenges to meet, the more opportunities would be caught if we could correctly recognize what we face and what we should do.

2 NEW CHALLENGES FROM THE WORLD

Today's world is characterized by unexpected changes in the trend of globalization, increasingly fierce international competition and rapid development of science and technology. Like all higher education institutions of China, CIM must be aware of the strategic challenges from all over the world and abundantly recognize the following influences and gears its reform and development to the new century.

2.1 The progress of science and technology

The dramatic progress of science and technology in the recent decades has bought a great changes to people's living style, thinking pattern and the learning method. There are so many of new science discovers, new technique inventions, new machines, new products, new media, new markets, new organizations and new standards series that the people's knowledge had to be renewed in a very short time. In order to keep with the development we should have a lifelong learning that result in:

- The aim of education and training in higher institution has been changed from passing knowledge to having the students of the learning ability that they would learn by themselves in all their life. The assessing system for higher education quality and the actual ability of college graduates will be changed more.
- The contents of education and training should correspondent with the development of science and technology as soon as possible. The higher education institution for engineering must strengthen the scientific research work, have an intense relationship with enterprises and build more cooperation with international.
- The engineering education should combine with humanity and the specialization education should combine with the generalization education together. In China, the special fields of study or the specialized subjects were originally very detailed because of planing economic and the following former Soviet Union pattern. Although in 1999, the special field number has been cut down from more than one thousands to two hundruds and fifty there are still more problems related to the special fields. Especially the education programs, the curriculums and the laboratory conditions need some surgical changes.
- The competition in science and technology promotes the development of education means. The computer science and technology, especial the Internet and virtual technique have changed traditional pattern of teaching and learning so much. The virtual instrumentation would revolute the experiments of measurements and instrumentation. The remote education and laboratory system extend the cooperation with other countries and universities. The education facilities and resources would be used more effectively and the information will be transferred in time.

2.2 The trend of globalization

The trend of globalization has been accelerated by more dependence on economic, technique and markets among countries and regions. There are more and more trades, investments and interactions in different countries and regions. In order to remove the barriers in trade and cooperation in the world, many new rules and procedures have been made by international organization. As a developing country, Chinese government adheres to the reform and opening up policy. The economic system is changing from planning to market. The development must base on the advances in science and technology and on the improvement in the quality of human resources. China should become the member of the world trade organization in near further. Therefore the engineering education in China, especially in China institute of metrology, featured in the areas of metrology, standardization, quality management, quality inspection and technical supervision, have to pay more attention to the contents of international standards and procedures for market access. In the engineering education programs and curriculums following areas of knowledge are basically included.

- The metrology infrastructures of the national and international
- The certification and accreditation procedures
- ISO 9000 series, ISO/IEC guides,
- The concept of traceable measurements

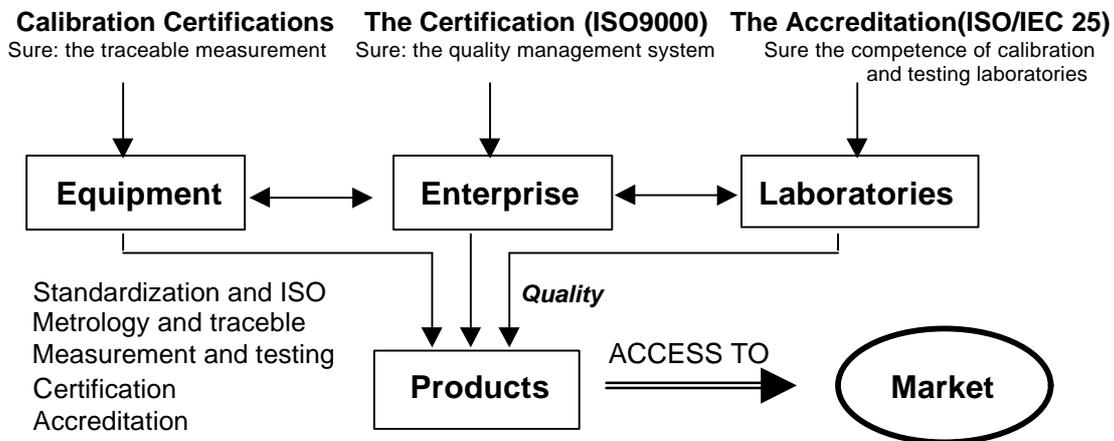


Figure 1. The basic requirements for market access

Figure1 shows the necessary requirements and procedures for one product accessing to a foreign market, which could be used as an outline to have lectures related the problem of the globalization. The students should have the knowledge about why all the procedures are introduced, how to work the quality management system, how to solve technique problems and where to find the necessary and valid documents.

3 NEW CHALLENGES FROM THE REFORM OF THE NATION

In china, the ultimate goal of reform and opening up is to liberate the productive forces, improve the national economic performance and promote the people's living criterion to a new level. After more than 20 years hard work, Chinese reform and opening up and modernization drive are entering the key stage. Aimed in strengthen the legal system building, drawing to competition mechanism and promote the quality of population, many measures and policies related to the system reform have been executed step by step. Two important reforms, the strengthening of quality and technical supervision and the deepening of education system reform would have a very profound influence to the development of China Institute of Metrology.

3.1 Strengthening of quality and technical supervision

As a larger, former plan economy and developing country, Chinese government has taken a serious effort to strengthen legislation on overall areas. In order to face the world and build a fair competition market, the function and position of the State Bureau of Quality and Technical Supervision have been strengthened ever before. Laws and regulations on all aspects of standardization, metrology, quality management, quality inspection and technical supervision have been formulated and improved. And most of these have a bridge to the international. The infrastructure of quality and technical supervision system that based on the metrology system has been built and intensified. In order to eliminate the regional protectionism and uniformly enforce the laws and regulations, all provincial, autonomous regional and municipal bureau of quality and technical supervision before conducted by local government will be charged directly by the central government. The modern metrology science and technical research work will be put to a new important position. A new research center is being built in Beijing. The system of accreditation for calibration and testing laboratories will be accelerated improved. The enterprises and corporations are urgent to build a quality system and sure the products of the competition competence on the market. All the trends show more opportunities and challenges to China Institutes of metrology:

- There are a large demand of human resoures of higher engineering education, featured in metrology, standardization, quality management and technical supervision. The higher education and job-training program in the CIM is necessary to the development of the national.
- The market economy requests a high comprehensive quality of the graduates, especially the basic knowledge and skill of science and technology, the ability to analyze and solve reality problems and the capacity to acquire the new knowledge. But presently the education content, the curriculum, the laboratory condition and the faculty of teacher are comparably draw back and need an extreme change and improvement in time.
- The competition for quality of the graduates and the efficiency of education among the universities and colleges results the difference in the name on society, the financial supports and the quality of enrollees. As a comparable new and small institute, CIM must consider its characteristics of metrology and quality management.

3.2 Deepening reform of education system

The national economic development depends on the level of science and technology and the quality of the population. As the foundation for the development, the education as a whole is insufficient and can not meet the needs for accelerating the market economy. The main problems related to the inadequate investment and the unreasonable mechanism for management to education system. When the strategic priority of education has been recognized by government and most of common people, more concrete and measures have been taken to speed up the reform of education system.

- To higher education system, the restructuring chiefly aimed adjusting the relations between the government and colleges, the State Education Ministry and other ministries and commissions. The most important work is to change the sponsor from the central government only one to central and provincial and other sectors of society. The management pattern for colleges

belonged to other state ministries and commissions will be changed. The local provincial governments will play an important role in the management and financing the colleges in their location. To China Institute of Metrology, that means a strategic challenge. Located in the east and south coast and near Shanghai, Zhejiang Province has a comparable market economy. There are a lot of private enterprises and special markets and people traditionally pay more attention to the education. The enrollment of students has a high quality. China Institute of Metrology has to adjust its relations with SBQTS and ZJP in order to find more supports and more development.

- In order to smooth all relationships among the sponsors. The key step is to formulate laws and regulations to specify the rights and duties of higher education institution. The colleges will have more freedom in management. The colleges now can make the decision in enrolling students, setting up specialties, adjusting structure, using funds, granting professional titles, paying salaries and engaging in international exchange and cooperation. What the colleges need is a mechanism of self-governing and self-developing.
- Another more important reform is related to the financial support to student. A few years ago if young people past a national examination for higher education enrollment and became a student of university or college the government would pay almost all cost for student in his learning terms, included his tuition and accommodation. As the non-compulsory education, the government will no longer pay all these expenses of college students. Student should in principle pay his tuition and other costs himself. The fee from tuition will be used to improve the conditions of running the college and a reasonable fee system including loan and scholar prize will gradually be introduced.

Figure 2 shows the management system and some main reforms of CIM. All these changes and challenges indicate that we must lose no time to preparing a long term strategic plan for the development of the CIM.

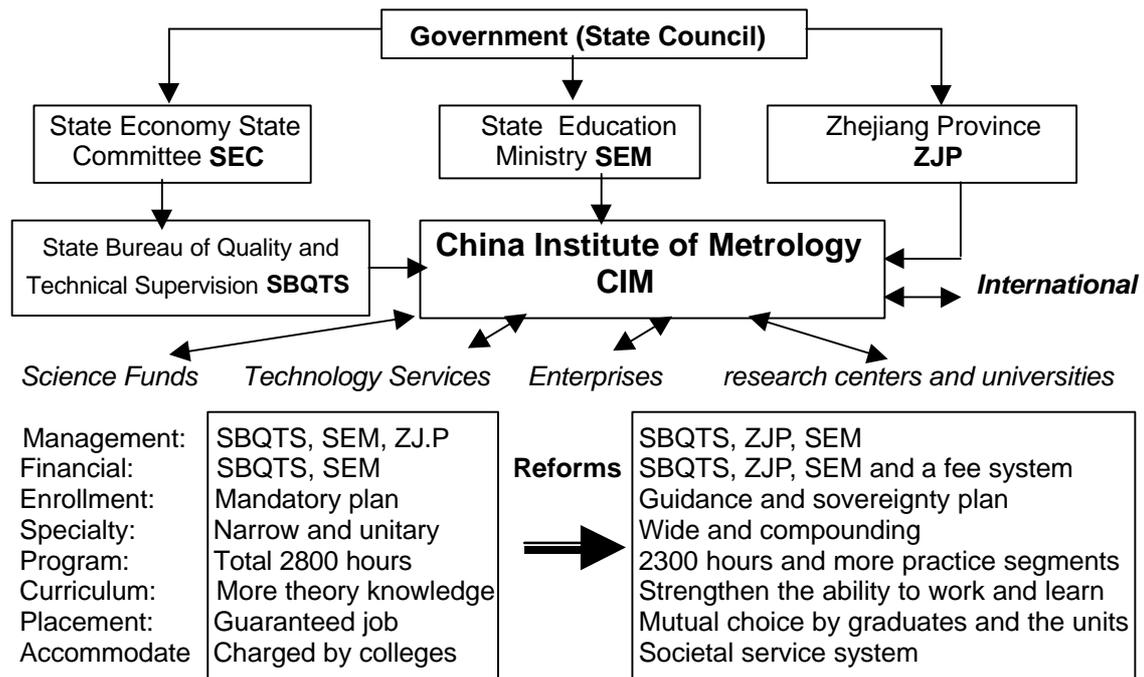


Figure 2. The management system and the reforms

4 THE STRATEGIC PLAN

The long-term strategic plan of CIM would base on the principle of "Scale, Structure, Quality and Efficiency" and we need to have four necessary conditions:

- *Changing the idea about education:* We need an open mind to recognize what have and what will happened in the new century, to know the strategic priority of education and the actual situation we have and what we must do and what we can do step by step.
- *Having more financial investment:* Now it is possible that total investment to education and to CIM

from central and local government will progressively increase. We should pay more attention to service for society and enterprises and find more supports from other sectors of society.

- *Reconstructing of management system:* It is very important that we need an active and effective direction both from SBQTS and local government. CIM should be put in an appropriate position in their long-term plans and do its best to service the national metrological infrastructure and local economy development.
- *Reforming the pattern of education:* This is the core of education reform and will introduce the actual result in the process of executing the education program. To cultivate the graduates oriented to the new century, the teaching content and methodologies will be improved on the principle of "profound foundation, strong capability, high quality and broad adaptability" We have updated all programs and some curriculums for B.A degree. And more efforts will be done on building laboratories and introducing some modern teaching means.

In CIM's the strategic plan, the following items would have more important position:

- Approved by local government CIM will have more another location or land in the modern science and technology development region for expanding its scale in near further.
- Approved by the State Education Ministry CIM will have the authorization to confer the master degree for the postgraduate education program.
- Supported by State Bureau of Quality and Technical Supervision and Zhejiang province CIM will have some key laboratories and specialties related the features of metrology, measurement and quality management.
- According to the demand of the national economic development and the self-development of the institute CIM will adjust its specialties in time, especially the specialties related to the quality management and law will be expanded and strengthen.
- Supported by foreign countries and international CIM will strengthen the international cooperation and exchanges. CIM welcome foreign scholars and experts to give lectures and Instructors are encouraged to attend academic conferences and to study or work in abroad. We hope to find some supports and cooperation with IMEKO TC1 and its members.

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