How to Train International Standardization Talents?

—The experience and revelation of ISO, IEC and ITU's standardization education which is international standardization organization

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Abstract—**The paper introduces the standardization of education in international standardization organization, analyses the content, methods, similarities and differences of three standardization organization's standardized education, puts forward several revelations which are china's standardization organizations, universities, enterprises through the use of education teaching resources platform in ISO, IEC and ITU, to participate in international standardization activities, enhance the level of standardization of Chinese education.**

Keywords—international standardization organization; international standardization talents; standardized education

I. INTRODUCTION AND MOTIVATION

With the rapid development of economic globalization and China's economic and social, the scope of the standard has been developed from traditional product standard and inspection method standard to management field, and from the field of production to the field of trade and support all areas of human sustainable development. Economic globalization has pushed standards to the forefront of international market competition. The standard has become the strategic commanding point of participating countries in international competition, and standardized talent is the main force to win international standard competition. Nowadays, international standardized talents have become the important human resources of the country [1]. In China, standardized talents are divided into technical standardized talents and management standardized talents. Technical standardization talents refer to the specialized talents who are engaged in technical standard revision, implementation and transformation of technical achievements in corresponding professional fields. Management standardization talent is a comprehensive talent that uses standardization principles and methods to improve the management level and efficiency of the organization. Technical standardization talents attach importance to the combination and application of professional, technical and standardized methods. Management standardized talents focus on standardized thinking, ideas, management methods and comprehensive abilities. International standardization talent is a comprehensive talent that understands both technology and management. Studies show that international standardization talent generally has the following four aspects ability: one is to master a foreign language and the basic theory of standardization, able to analyze the key technologies by

standard train of thought, analyze the work content, the differences of interests and needs of the international standardization working group, and have the ability to prepare high-quality English proposal text; Second, be familiar with the international standardization workflow, and can communicate with the team leader, experts and secretary-general of the international standardization organization. Third, be familiar with develop, revision and trend of the relevant international standards in the field; Fourth, have the spirit of win-win cooperation, can strive for a certain number of different experts to participate and support the standard of our country. How to train international standardization talents with the above four aspects? The standardization education activities of the International Standardization Organization (ISO, IEC and ITU) are worthy of our learning and reference.

II. STANDARDIZED EDUCATION IN INTERNATIONAL STANDARDIZATION ORGANIZATION

International Organization for Standardization (ISO)[i] is a specialized agency that sets most parts standards in the world; International Electrotechnical Commission(IEC) [ii] is a specialized agency that sets standards about international electrical engineering and electronic engineering; International Telecommunication Union (ITU) [iii]is a specialized agency that sets global telecommunications standards. ISO, IEC, and ITU are internationally renowned standardization organizations, recognizing that standardization education is playing a significant role in raising awareness of standardization and understanding standardization. Therefore, they have carried out a large number of standardized education trainings, aiming to achieve global "connectivity" through training a large number of international standardization talents.

A. The standardized education trainings of ISO

ISO is an independent, non-governmental international organization. It brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges [2].

ISO standardized education training including [2] : Develops master degree courses of "standardization, social regulation and sustainable development" in collaboration with the university of Geneva, Switzerland; Invites more than 20

experts in teaching which are executives from international organizations, famous enterprises, non-governmental organizations as well as professors from the universities. The master is an interdisciplinary program including sociology, management and economics. The program focuses on sustainable development and in particular the idea that development processes need the active involvement of all parties likely to contribute to or to be affected by them. It underlines the importance of the participatory processes involving public and private actors at various levels ('social regulation'), including the standard-setting practices that provide essential voluntary agreements supporting the dissemination of knowledge, best practices and monitoring tools. All teaching materials developed by ISO for this program are available to the ISO members. ISO also cooperates with the Hautes Études Commerciales (HEC) of the University of Geneva and the Haute École de Gestion (HEG) of the Haute École Spécialisée de la Suisse Occidentale (HES-SO), on the Diploma of Advanced Studies (DAS) on Sustainable Management.

ISO also sets up a platform of standardized education information and develops the textbooks material database (Teaching materials include education textbooks in primary and secondary schools, education textbooks for universities, and materials on standards courses for teachers and standard professionals). ISO also encourage each member to share its standardization education information on the platform including teaching materials, research papers, policy report; Organizes all kinds of international standardization education conference and academic research activities and provides the countries with the platform to explore the issues of standardization education; Establishes a "higher education award" for higher institutions, rewards the pioneer education institute for carrying out standardization activities and to promote the successful experience of developing standardized courses or training programs.

B. The standardized education trainings of IEC

The IEC standardization education activity is closely related to the professional field, with high professional requirements and technical pertinence. IEC offers on-the-job training courses, which are divided into field training and network synchronization training [3]. Training contents include the IEC standards development related issues, including how to design the terms and definitions, how to write normative reference file, how to prepare technical content of standards, how to update and revision, how to participate compilation work in other IEC publications, etc. According to the requirements of training staff, IEC provides specialized training courses. IEC holds different themes and types of standardized conferences at the Geneva headquarters and around the world every year and invites related people in the field of professional around the world, shares and interacts the new discovery and new experience, to improve the level and ability of standardization practitioners in the field. In order to achieve the goal of resource sharing, IEC has set up a platform of teaching resource information, collecting and sorting all kinds of information materials and uploaded to the official website for study. "IEC challenge" paper competition, invites scholars from different universities to give professional lectures on standardization around the field characteristics of IEC standards in various universities, scientific research institutes and standardization institutions, etc.

C. The standardized education trainings of ITU

Considering the complicated, rapid development and the changing characteristics of global telecom industry, ITU standardization education activities development are more inclined to experience exchange, results sharing and information transfer manner. ITU established ITU College, which aims to integrate and provide education and training in the standardization of information communication technology, to form an integrated and simplified talents training model. In the development of the course, ITU offers students three ways including face-to-face, mentoring and self-directed online learning, while creating Learning Management System (LMS), to facilitate the tracking and management of various training and education courses, and to provide different learning materials for participants of different learning schedules [4]. ITU-T holds a variety of standardized workshops, seminars, webinars worldwide every year, which are related to information communication technologies; ITU telecom development department (ITU - D) sets up a study group, makes reports, guidelines and recommendations by investigation, case study and other ways, and then feedbacks the results to the students through the network, publishing ways, to provide opportunities to share experiences, exchange ideas and views, and develop strategic consensus for member states and department members.

III. EXPERIENCE: DIVISION OF LABOR AND COOPERATION

ISO, IEC, and ITU develop standardized education in their respective standardization areas, which have something in common and something in different.

A. Division of labor: ISO, IEC, and ITU standardized education contents and methods

ISO, IEC, and ITU standardized education contents and methods in table 1.\

TABLE I.   ISO, IEC, AND ITU STANDARDIZED EDUCATION CONTENTS AND METHODS

Education/training contents and methods	International Standardization Organization		
	ISO	*IEC*	*ITU*
training courses	Develops master degree courses of "standardization, social regulation and sustainable development" in collaboration with the university of Geneva, Switzerland; On-the-job training	Provide on-the-job training in electrical and electronic engineering fields.	The ITU institute offers systematic, medium - and short-term, targeted training courses.

Cont. to TABLE I			
Teaching resource	Yes. Develops the textbook database, which focuses on the basic knowledge of standardization, metrology and conformity assessment.	Yes. The teaching materials focus on professional books, papers and research reports [5].	Learning Management System
Special conference/seminar/Forum	Yes	Yes	Yes
Set "higher education award"	Yes	"IEC challenge" essay competition	No
Study group	No	No	Yes

Data Source: author to sort out

From the above table, we found that ISO, IEC, and ITU are in common place in the standardization education development: There are specialized on-the-job training courses; Training methods have in field training and network training; Organize various forms and types of international standardization education conferences and academic research activities to provide mutual learning and interaction platform to the countries of the world; Develop standardized textbook databases or learning systems on their respective websites. There are also differences: for example, the training content and method combined with the characteristics of their field, the ISO focuses on promoting the successful experience of developing standardized courses or training programs in various fields; IEC's online teaching platform focuses on professional books, papers and research reports; ITU is more inclined to engage in exchange of experience, sharing of results and transfer of information.

B. Cooperation

ISO, IEC and ITU, not only actively promote and organize various types of standardized education activities through its international influence, but also cooperation creates the world standards cooperation organization (WSC)iv, to promote the standard widely used throughout the world. Under the auspices of WSC, IEC, ISO, and ITU continuously strengthen the close cooperation in the academic field. Led by WSC, the three agencies jointly or separately undertake academic activities, to strengthen the publicity and promotion of standardized education in various ways, to raise awareness and application of international standards.

IV. SUMMARY AND REVELATION

At present, in China, international standardization talent cultivation way is through the learning courses in university, and master the knowledge of the international standardization, cultivate their ability to work; another way is by government organizations relevant international standardization talent training class to targeted learning. Use of online resources, especially the network resources of international standardization organization to learn less. The training of the standardization talent education in the international standardization organization gives us the following enlightenments:

- With the help of ISO, IEC and ITU's international platform, we can train our international standardization talents. ISO, IEC and ITU vigorously promote the international and national standardization talents training, strengthen communication and exchanges between international standardized talents by setting the standard curriculum, network and field training, and organize all kinds of forum, seminars, and essay competitions. Standardization organizations, enterprises, colleges and universities in our country actively participate in different types of standardization education activities in ISO, IEC and ITU, make good use of the great resource platform about international standardization education, and train our talents on international standardization.

- Standardization organization in our country, such as the China national institut of standardization, China association for standardization and the professional standardization organization in the various field, can learn the practice of ISO, IEC and ITU, use the grasp of the organization resources and expert resources, collect, sort out the international standardization information resources, to form professional learning materials and database, providing seminars, forum etc. for domestic standardization talents learning and communication.

- Through organizing to participate in international standardization activities, cultivating a group of international standardization management and technical personnel who are grasp international standardization work rules, can directly fully communicate with foreign experts and professional institutions. On the basis of this, we will broaden the participation of intermediate standardized talents in international standardization affairs and comprehensive cultivate international standardized talents at different levels.

- By participating in international standardization activities in the field of the enterprise, the international standardization talents of enterprises accumulate practical experience. On the other hand, taking part in international standardization organization courses learning, seminar and forum, etc.to enhance international standardization ability through communication and cooperation.

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i ISO is a global network of the world's leading standardizers. Through the members (the national standards bodies in 163 different countries), ISO bring together experts from all over the world to develop International Standards that support innovation and provide solutions to global challenges.

ii The International Electro technical Commission (IEC), founded in 1906, and has a history of more than 90 years. It is the world's earliest international electrician standardization body, responsible for international standardization in the field of electrical engineering and electronic engineering.

iii Established in 1865, International Telecommunication Union is a United Nations specialized agency and the oldest international organization in the United Nations body. The actual work of the international telecommunication union shall be borne by the three departments, they are: telecommunication standardization sector of the international telecommunication union (ITU-T) and international telecommunication union radio communication (ITU-R) and the international telecommunication union telecom development sectors (ITU-D). The telecommunications standardization sector from the merger of the standardization work departments in the international telegraph and telephone consultative committee (CCITT) and the international radio consultative committee (CCIR), main responsibility is to achieve the goals of the International Telecommunication Union which is relevant to telecommunication standardization, to make telecoms standardization around the world.

iv The World Standards Cooperation (WSC) established by the International Telecommunication Union (ITU), the International organization for standardization (ISO) and International Electro technical Commission (IEC) in 2001, aims to strengthen and promote the international standard system which is the voluntary, based on the consensus and developed by ITU and ISO and IEC.