Upgrading knowledge competitiveness is the new mission of higher education*

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Abstract: In the era of knowledge economy today, social development and progress are much more relying on HEIS (higher education institutions) than ever before. Besides, the three familiar missions of "training capable persons", "doing research" and "serving the society", in the tussle of knowledge race in East Asia, a new mission for HE (higher education) has been added, i.e., upgrading knowledge competitiveness. To attain this target, HEIs should aim at the innovation of HE, accumulation of knowledge capital, ability-building of human resources and blossom of boundless HE.

Key words: knowledge competition; exploitation of human resource; higher education innovation

1. Introduction

The concept of "knowledge competitiveness" is used internationally to label the ability of changing knowledge capital and human capital into the production of a knowledge-based economy[1] and social wealth of a region. The basis of this wealth is human capital and knowledge capital. Knowledge competitiveness has become the foundation of the all-round competitiveness of individual countries, and this has tremendously influenced the countries' competitiveness in military affairs, politics, culture and many other aspects of these countries. The American economists, Theodore W. Schultz and Gary S. Becker created the theory of human capital in the 1960s. They thought that this theory has two central viewpoints: (1) In the progress of economic growth, the effect of human capital is huger than that of material capital; and (2) The main part of human investment is the promotion of the quality of the population and education investments.

Without any doubt, in this era of knowledge-based economy, in which economic transformation as well as economic growth are warp and weft, education has attained a key position. Indeed, education has become a basic instrument to develop human resources. The system of HE (higher education) has become the "axial structure" in the society, called "the post-industrial society" by Daniel Bell, and HEIS (higher education institutions) have become the "axial organizations" in this society. As "axial organizations", HEIs are so important for people's

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[1] Knowledge economy is short for "knowledge-based economy". In the report of "Knowledge-based Economy", the OECD (Organization for Economic Co-operation and Development) gives following definition: "The economy directly rely on the production, distribution and usage of knowledge and information".

existence, development and prosperity, that all countries have paid more attention and offered more support to them than ever before.

As everybody knows, the training of capable persons, scientific research and social service are the major recognized HE missions at present. With the gradual progress of HE's entrance into the center of society, various new paradigms have presented themselves in the system of HEIs and at the same time the connotations have changed, too. In the early 1990s, Professor Smith from the University of North Texas (USA) discerned the following four modes of a university: "I endeavor to put forward the following 4 university modes: as a company, as an ideology agent, as a social service organization and as a scholar consortium". These 4 modes of a university make clear that the traditional description of a university: a 4-year long education system of students, living on campus, classroom-based teaching as undergraduates' education, graduates' education differentiated in academic fields and colleges, teaching staff mainly engaged in training capable persons by teaching, doing scientific research and service to society—is not enough to describe HE.

Since the founding day, universities have influenced the society to a certain extent. With the social progress, the functions of HEIs have evolved, the connotations have been continuously extended, showing the universities developing from singularity to diversity, from scholasticism to socialization, from the education value of "training capable persons" to the double ideal of Alexander von Humboldt's focus on both scientific research and teaching, and then finally directly to the idea of serving the society learned from Wisconsin University in the USA in the 1960s, which is the symbol of the evolvement of the HE function. In the 21st century—the era of knowledge-based economy, knowledge economy with the characteristics of knowledge as the foundation, science and technology as the engine, innovation as the motivity, educational human resource as the first resource, has brought for HE many opportunities and challenges, and at the same time has determined the development of HE: promoting knowledge competitiveness as the new mission of HE. Answering the question "How HE should shoulder the important historical mission of promoting knowledge competitiveness" is a key issue for the author's HE research.

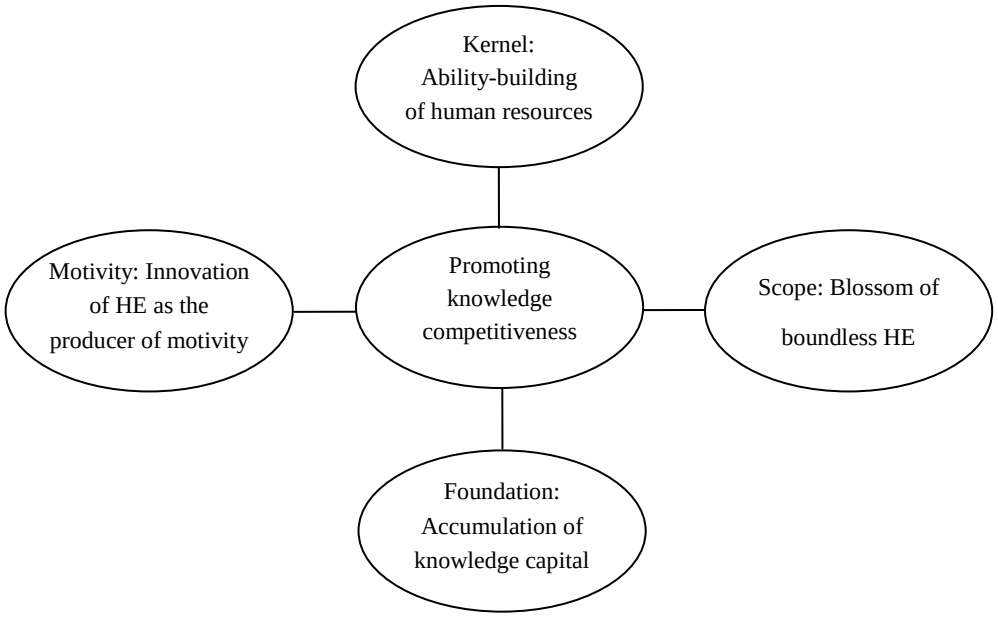

Figure 1 The 4 basic ideas of HE's upgrading knowledge competitiveness

This paper will show that the new mission of HE is the upgrading of knowledge competitiveness. In order to attain a position in the knowledge race for East Asia, it needs to support 4 basic ideas: (1) innovation of HE as the producer of motivity; (2) accumulation of knowledge capital; (3) ability-building of human resources; and (4) blossom of boundless HE.

2. Innovation of HE as the motivity of knowledge competitiveness

Probing into HE's function is an old but ever-lasting topic, not only showing a university's grandeur and holiness like "macroscopical narratation", but also expressing people's "Utopia" complex to a university. A university, often called as a "tower of ivory", is one of the most conservative organizations. Clark Kerr, a former president of University of California (USA), made a survey on all the organizations before 1520 AD all over the world, found that among those organizations that still used the same names, did the same things the same way at that time, only 85 survived, among which 70 are universities, while the other 15 are religious organizations, which shows that a university might be a stable and ever-lasting organization. Though today's university still has its stability and relatively independence, it is no longer the "tower of ivory", nor is it living outside society. In the knowledge-based economy, universities have become the source of innovation and have contributed to social progress.

Innovation is the soul of a knowledge-based economy. The main difference between humankind and animals is that humankind has the ability to create. Incessant creation is the inherent need of humankind's self-existence and development. Only with the ability of creation, can humankind incessantly evolve and continually make progress. As a consequence, the innovation function should be added to the HE agenda.

The education function is an expression of the present and future need of individuals for education. During the historical development of higher education, universities make incessantly choices and embark on innovation, along with the need of science, technology and economic development. At the beginning of the knowledge economy, there was a "re-construction of the function system" of the university, and gradually universities contributed to the social economic development of society, and constituted a new function of HE, impelling at the same time the development of the knowledge economy. The re-construction or the creation of this HE function at least consists of the following 3 aspects (XIE, BIE, WU & HUANG, 2007).

2.1 HE as the source for motivity of intelligence

Intelligence is the most fundamental and deep-seated motivity source in the human society, catalyzing the development source of social production. In the knowledge economy, with the development of a new-generation industry of information, science and technology, along with the production and expansion of intelligence and knowledge, as a very intelligent brain that can engender incessantly new ideas and integrate efficiently various resources, will play a much more important role. HE must take an active part in society, work as brainpower in decision-consultation for the whole society, provide technology service and intelligence support for economic and social development, making HE the think tank for social economic development.

2.2 The function of HE as an "incubator" and "engine"

HE, especially in key universities, is not only the "source of knowledge creation", the "bank of capable persons", the "disseminator of culture", but also the "incubator" and "engine" of the development of high-tech production (XIA, 2002). The function of HE as an "incubator" and "engine" has 2 characteristics: (1) HEIs have become the cradles and seedbeds of high-tech's innovation, growth and utilization; and (2) A lot of industry parks are scientifically supported by universities and flourish and develop very fast.

2.3 The bridge function of HE

The obvious characteristic of modern high-tech economy is that high-tech staff have become the main labor force. Training these "knowledge workers" implies specialized vocational education. The faster the economy increases, and the higher the social development, the stronger the marketization will be, the more need there is for decision-makers and managing staffs, and the more important the contribution of HE is to train three staff.

Education plays important roles in humankind's cultural development. One of the roles of education is creating and innovating knowledge. The knowledge-creating function benefits from the typical university structure where new information and academic thinking is exchanged, and enthusiasm for innovation and openness for academic freedom may be found. Therefore, the president of the University of California at Berkeley (USA) said that, a university which "seeks new thinking and new knowledge", always "stands in the most anterior line of criticism" and is a "foreland with creation ability". No doubt, in the knowledge society, the innovation of knowledge is an important function of HE.

3. The accumulation of knowledge capital: The premise of knowledge competitiveness

A knowledge society is a knowledge-based society. Knowledge has gradually changed from the exterior to the internal of social development and from the brink to the center of the society, which provides the explanations to the world's modes in social origin, motivity, factor, track and others. In modern society, HE still has the main functions of preservation, transmission and creation of knowledge capital (YAN, 2003).

3.1 Preservation of knowledge

Because scientific knowledge is often seen as "value-free", which is often considered true, and public wealth should be cherished and shared, as a place where deep learning is discussed, no doubt, HEIs have the important function of preserving knowledge. University libraries have played a crucial role in the preservation of knowledge. They are not only the organizations that preserve a wealth of knowledge, nor do they only fulfill the indispensable task to communicate knowledge in the communication chain of knowledge, but they are also one of the composing parts of the HE system, which is necessary for high quality teaching and research. Explicit knowledge is usually preserved by such means as libraries, labs and multimedia, while tacit knowledge is mainly preserved in the scholars' brains. Universities are composed of learned experts and scholars whose tacit knowledge cannot be preserved in libraries. So it can be said that knowledge exists both in life carriers and non-life carriers. Without the tacit knowledge of the scholars' brains in HEIs, knowledge in society is incomplete.

3.2 Transmitting knowledge

Knowledge transmission has two meanings in Chinese: one is "chuan" (传), which means "transmission" of the present culture and researches in order to be shared in the world, emphasizing the broadness of space, namely, "the expansion of knowledge"; the other is "cheng" (承), which means "hand-on" the predecessors' knowledge, thinking and cultural production that is passed down from generation to generation, emphasizing the succession of time, namely, the "heritage of knowledge". Teaching in HEIs is the most important manner of knowledge transmission. It transmits the best cultural production that is accumulated in human civilization for ages, by teachers' "teaching students' knowledge, telling students the way to live and answering students' questions" (a famous sentence from the article of *On Learning from Others* by HanYu, an educator in Chinese Tang Dynasty).

By training capable persons, HE realizes the target of knowledge transmission. Capable persons' acquired knowledge in HE directly enters such domains as social politics, economy, culture and other fields. As one kind of "knowledge intensiveness", once "capable persons" step into society, they become "knowledge nodes" which can naturally converge into a mass and at last into a "knowledge source". This means that they become a social knowledge colony or a knowledge stratum that takes care of knowledge expansion or knowledge radiation. In the era of a knowledge society, diplomas acquired by learning have become the passports to society. To some degree, HE all over the world has put the function of knowledge transmission on its shoulder.

3.3 Creating knowledge

Of all times, since the founding of HEIs, academic and scientific research activities have been conducted. The neoteric universities, influenced by the von Humboldt's university type, are research universities that focus on scientific research and promote science, technology, as well as the creation of culture and knowledge. In the era of fast development of science and technology along with an explosion of knowledge, the impelling force of the knowledge society continuously and vividly expands the function of knowledge creation in universities. The university is a place of knowledge production. Seeking for knowledge is the self-evident goal of an academic career. Much knowledge does not attain a complete or a final conclusion. Consequently, teachers and students have to continue researching and creating knowledge. New knowledge is created by discussing, communicating and understanding various cultures and thinking, which makes social progress possible and promotes cultural development. HE trains students' character and improves their capacities by transmitting specialized knowledge. Later on, HE delivers these capable persons to society, and each in his/her own position is engaged in all kinds of activities that "radiate" knowledge in society. No doubt, knowledge creation is the most energic and vital function of higher education in a knowledge society.

4. The ability-building of human resources: The kernel of knowledge competitiveness

The economic development all over the world proves that human resources are the most valuable resources to promote economic development. The usage of human resources is the best approach to increase economic efficiency and add social wealth. The best known example of this phenomenon is found in the fast growth of the economy of the "Four Asian Tigers" (Korea, Singapore, Hong Kong and Taiwan). Based on such aspects as population, area and natural resources, these four countries and regions are "inborn undernourished have-nots". However, they have reached economic prosperity and grown up in the Orient for only a short period of time after World War Two. The whole world is struck on them and praises them for their important influence on the economy and the development of international relationships, international affairs, international finance and international trade. Seeking for the reason of this wonderful achievement, observers came to the same conclusion: The main reason for the economic prosperity of the "Four Asian Tigers" can be found in their special attention for, huge support to and fast development of education. Not only these countries but also the individual citizens invest a tremendous sum of money in education in order to raise the level and quality of education. In this way, they build the citizens' ability to store-up, open-up and use human resources. It is clear that the knowledge accumulation and intelligence support from highly-trained citizens guarantee this economic development and fast-growing affluence.

In recent years, people are no more unacquainted with such concepts as human resources and exploitation of human resources, but for the majority, "ability building of human resources" is still a new and unacquainted concept. Generally speaking, by means of education, training, encouragement and employment, "ability building of

human resources" can be considered as opening up persons' potential, raising persons' quality, mobilizing their enthusiasm, bringing persons' potential into play, increasing the ability of knowing and changing nature for both an individual and a group, in order to promote the social progress and the all-round development of an individual. It is very similar to "exploitation of human resources" in its broad sense, but their goals, keystones and perspectives are different. The exploitation of human resources takes an economic standpoint and considers persons as objects, sees them as a substantial resource (such as the products made in a factory), while ability building of human resources considers human resources as persons and their main goal is increasing persons' ability. Ability building of human resources emphasizes particularly the ability of humans. The process of ability building of human resources is one of the methods to train a person's ability, a new ideal of exploitation of human resources. To attain the most important objectives of ability building of human resources, 4 abilities should be supported.

4.1 Students' study ability

People refer to the word "study" almost every day, but they might have very different ideas about it. For most people, the word "study" is often related to the activities in school or learning in order to pass some exams or quizzes. In this paper, the word "study" not only refers to exams in schools and all that is related to, but also refers to the process of mastering discipline knowledge, the ability of acquiring new knowledge and carrying on new practical actions by various study measurements. In the current stage of economic development, acquiring knowledge and information by Internet is one of the study abilities that are specially strengthened. Students' study ability is the foundation of ability building of human resources.

4.2 Students' creation ability

Innovation ability means the ability to innovate knowledge. Building students' creation ability should focus on a 3-dimensional target: (1) the dimension of "knowledge techniques": The techniques of innovation should be numerous and of high quality; (2) the dimension of "innovation thinking": Innovation activities still need adopting such thinking methods as analysis, synthesis, comparison, abstraction, generalization, embodiment and systematism, but comparing with other thinking activities, innovation thinking has a special feature: both logic and non-logic thinking, and both dispersive and convergent thinking are needed, i.e., a circular process of dispersion—convergence—redispersion—reconvergence; (3) the dimension of "innovation personality": An innovating personality should have the strong willpower to overcome difficulties, pay close attention to various problems in nature and in society, and go-ahead incessantly and seek for new founding. Innovation ability is the kernel of ability building of human resources (JIANG, 2008).

4.3 Students' adaptation ability

The adaptation ability is the self-adapting ability in order to adapt the environment and social ability to the habitation and environment. The evaluation index of adaptability mainly includes environment adaptation, interpersonal adaptation and individual adaptation. Environment adaptation mainly consists of information collection, information discrimination and survival ability. Interpersonal adaptation mainly consists of the connotation, the methods, the depth, the width and the effect of the interpersonal communication. Individual adaptation mainly consists of two aspects: (1) Individuals should be aware of competition consciousness, combat spirit, adventure spirit, team spirit, collaboration consciousness; and (2) Individuals should also have knowledge of individual behavior as frustration, competition, collaboration, self-study ability and modern ways of living (WEN, 2007). Crocodiles' species imperishability and chameleons' color-changing self-protection are some examples of the adaptation ability of animals. The message is: adapt to the society, or you will be eliminated cruelly. Adaptation ability is the guarantee for ability building of human resources.

4.4 Students' competition ability

Competition is an instinct that is inherently injected into mankind's blood by biologic evolution, mainly referring to the strategies and methods of competition, especially the competition idea of establishing a "win-win" situation, because modern social competition is not always a "life-and-death" competition, but often a "win-win" competition based on the methods of cooperation, teamwork and alliance. Living in a competitive society, competition can be found everywhere. Therefore, people should train students to acquire competition consciousness, let them know the cruelty of competition and engage them actively in competition. Only this way, can students survive in the modern society. Competition ability is the strategy of ability building of human resources.

5. The blossom of boundless higher education: The scope of knowledge competitiveness

On the macroscopical background of globalization, with the fast development of ICT (information and communication technology) as well as the advancement of the tidal wave of education marketization, various borders of traditional HE, whether national or regional, whether institutional or idealistic, whether mental or physical, are all in the transition to "boundlessness".

Today, the reform of HE has gradually entered a new stage of "boundlessness", namely, getting across both the traditional institutional and regional borderlines in the traditional mode in space as well as in concept, which makes HE's borderlines become much more confused and penetrable. The word "border" refers to the boundary between countries or regions. If the HE border is like a fixed and stiff wall, it will block the mobility of such factors as information, knowledge and innovation, exchange of capable persons in the world, and a lot of problems will emerge.

"Boundless higher education" refers to an opening-up HE ideal, where exchange and communication of ideas cross the border of the institutions. It does not mean completely removing the border and being in a state of boundlessness, but means that people do not allow the border as an unchanging partition to petrify HE. People have to find a balance between "haves" and "have-nots", hoping that HE organizations will efficiently work. In the first Global Forum of Quality Assurance of Higher Education in 2002, Robin Middlehurst from the University of Surrey in the UK pointed out that "boundless higher education" referred to the following 4 aspects: (1) from the perspective of the education type: the appearance of such non-regular education as adult continuing education; lifelong education broke the borderline of studying in regular and non-regular HEIs, mainly accentuating the acquirement of the opportunity of lifelong education; (2) from the perspective of the public and private HEIs: the appearance of private HEIs, especially some private and commercial education services that want to make profit; they broke the borderline of the concept of traditional HE as a "public product"; (3) HEIs cross the border of countries and regions; for example, new company universities established by enterprises, public departments and HEIs, education services at home and abroad supplied by cross-national associations and various cooperatives; and (4) HEIs cross the border of time and space by offering long-distance education, online study activities and various virtual universities (ZHANG, 2005). This shows that "boundless higher education" encompasses a wide variety of items. At present, boundless HE at least covers the following 4 aspects.

5.1 Boundlessness of HEIs

Boundlessness of HEIs emphasizes the cross-national and cross-campus cooperation of HEIs, mainly including 3 types: (1) branch campuses; for example, Malaysia has a branch campus in the Australian Monash University, a branch campus in the Australian Curtin University of Technology, a branch campus in the British

Nottingham University, etc.; (2) a twinning program; for example, the cooperation programme between the University of Warwick in the UK and Chulalongkorn University in Thailand, and the James Cook University in Australia has established a joint-school in Singapore, and an "International MBA Cooperation Project" in China, etc.; and (3) off-shore institutions; for example, Monash University in Australia has founded an off-shore institution in Malaysia and provide education service in South Africa for the local students.

5.2 Boundlessness of learners

Boundlessness of learners refers to students' cross-boarder mobility, which have already appeared early in the Middle Ages, namely, when students studied at foreign universities, they use Latin as teaching language facilitated this mobility. Today, many sorts of students join in the range of boundless HE, including the students who enjoy education in their home country provided or recognized by a guest country, the students studying in their home country for some time and later in one or more guest countries for a period of time, the students studying far away from the campus in the home country, etc.

5.3 Boundlessness of curriculum

Boundlessness of curriculum refers to the cross-boarder mobility of a curriculum. This is an obvious and peculiarly mobile phenomenon of boundless HE. In this form of boundless HE, the physical position of the students remains unchangeable, but supported by Internet technology, the curriculum has been exchanged between countries. In his own home country, a student can study the curriculum provided or recognized by a guest country, listen to a series of lectures given by a guest professor on a virtual campus, etc.. Twinning programs and branch campuses are established in a foreign country, and "online" curricula are developed by information technology, all these will become the main tendency of the future development of boundless HE.

5.4 Boundlessness of study

Boundlessness of study refers to the expansion of the learning contents and the scope of learning. It is a study method in which the binary structure of "in class" and "after class" teaching and learning in the traditional curriculum is merged, and it focuses on mankind's life and experience, recomposes students' individual "biography experience" and promotes students' self-construction. It emphasizes the ideal of the learners as the center. It exceeds the traditional study space, time and contents that have been disconnected subjectively in the traditional teaching methods. It combines specialized disciplines, nature, society and students' living, and brings students much closer to society, nature and living by observing their essences and upgrading their quality to reach the education target of multiple development. A good example of this is flexible study. Students can apply for cross-grade courses, may choose parts of the curriculum of higher grades or others according to their own needs.

Today, people should adopt "boundless HE" as an important concept to explain the penetration and transcension of the various education spaces, education types and education organizations at home and abroad. The final target is to establish a new-type of borderless HE whose bound of institution, time and space is becoming permeable and merged in order to make East Asia take up a common position in the knowledge race.

6. Conclusion

In the traditional society, the production and transmission of knowledge was difficult and rather small. Independent HEIs, having special rights, could implement their duties, namely, the production and transmission of knowledge. HEIs were only the social antennas and decoration, whose role is to transmit high and deep knowledge. The role and orientation of HE was only "higher education in the society". At that time, HE was "the

tower of ivory", dissociated itself from the social development and did not have to satisfy the social needs. Therefore, the position and the role of HE were relatively independent in the society. In the era of the knowledge economy, things are reversed: The order of society, knowledge and HE has been re-ranked, and the role of HE is not any more the role of "higher education in the society", but "higher education of the society". It is very difficult for HE to deny the social needs and put itself free from society. HE must satisfy and adapt to the needs of the social development. In history, there were never "knowledge-based economy" and "knowledge activity-based education" that have been so closely connected and naturally combined. In the knowledge society, all kinds of activities in HEIs are carried out focusing on teaching and learning, concerning "knowledge", and the degree of social dependence of HE has greatly risen. Besides the three familiar missions of "training capable persons", "doing research" and "serving the society", in the tussle of the knowledge race in East Asia, a new mission for HE has been added, i.e., upgrading knowledge competitiveness.

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