Chapter 12
Reaction to Academic Ranking: Knowledge Production, Faculty Productivity from an International Perspective

Akira Arimoto

12.1 Introduction

Considering the fact that academic ranking has been introduced internationally by agencies such as the London Times (THES), Shanghai Jiao Tong University, and US News and World Report, we can predict an institutionalization of academic ranking throughout the world. Almost all countries are reacting to such situations by competing for high rankings for their institutions. Yet, the results of the rankings attract much criticism because of the inadequate criteria they employ.

On the other hand, it is also natural for every government, university, academic, and other individuals to pay attention to rankings, since they are apt to have a global impact. In fact, there is tendency for governments and universities to overrespond to the rankings by seeking to strengthen systems and institutions in readiness for competition.

In this context, the academic profession should pay attention to the kind of response that is being made. It is the academics as agents, or main actors, who are directly committed to the academic work of research, teaching, and service that usually provide indicators for the process of academic ranking, and who contribute to the development of academic productivity through both research and teaching productivity.

This chapter seeks to deal with the main theme "Reaction of the Academic Profession to Academic Ranking," analyzing it from the author's own perspective. The theme of "Reaction of the Academic Profession to Academic Ranking from an International Perspective," is approached with a focus on the USA and Japan as case studies. The main materials used for the following analysis are based on various sources, including the author's proceeding articles, and the results of the CAP (Changing Academic Profession) survey, which was conducted in 2007 by 18 countries (Arimoto 2008, 2009a, b; RIHE 2009).

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12.2 Knowledge Production: Framework of Research

12.2.1 Paradigm Shifts of Knowledge Production

As shown in Fig. 12.1, the academic profession as well as academia (universities and colleges) is changing in accordance with social changes. The essence of the structure in the figure means that academia is changing from "academia 1" (A1) to "academia 2" (A2) in accordance with the environmental changes. The first great environmental change is a social change caused internationally by trends such as globalization, knowledge-society orientation, marketization, etc. Through similar trends, modern universities were established in industrial society, and A1 structure was developed at the time of the post-industrial society and the information society. An A2 structure, emerging today as a knowledge society, develops from an information-orientation society. This has been apparent from the 1960s. The concept of the knowledge society, which Peter Drucker argued for in his "Post-capitalist Society" (Drucker 1993), has spread over the world since then so that the universities and colleges have been forced to respond to this environmental change. At the time of A1 structure a community of knowledge was prevailing, while in the A2 age an enterprise of knowledge is increasingly prevailing, in which an entrepreneurial university and even academic capitalism are appearing (Clark 1998; Slaughter and Leslie 1997).

The other large environmental change is a reconstruction of knowledge. As Michael Gibbons et al. pointed out in 1994, reconstruction of knowledge from

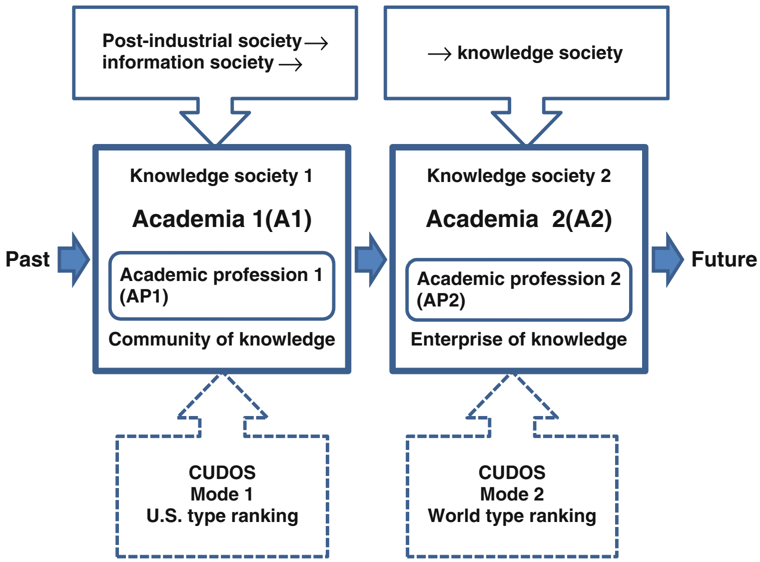

Fig. 12.1 Framework of research

"mode 1" to "mode 2" has occurred (Gibbons et al. 1994). Taking this into account, the response of traditional academia has to be a transformation to a new academia structured for "mode 2." Academia had already constituted a knowledge society in prior years, because it ceaselessly pursued academic work on the basis of academic disciplines, or advanced knowledge. But it is considered a knowledge society corresponding to knowledge of "mode 1" type. Today, total society has become a knowledge society incorporating knowledge of both "mode 1" and "mode 2" types. In this context, A1 needs to be transformed to a new A2 to embrace not only a knowledge society but knowledge itself.

Given this, academic staff has to change from being "mere academic staff" to becoming an academic profession, or strictly speaking, a status of achieving academic professionalism. Specifically, as described below, it was in the second half of nineteenth century when the graduate school was institutionalized in the USA and a Ph.D. was established as a "union card" to enter academia. As Light (1974) described it, the academic profession emerged when the graduate school worked as a function of preparation for an academic career. The academic profession at the time of a community of knowledge is considered to be "academic profession 1," while the counterpart in the era of an enterprise of knowledge is considered to be "academic profession 2." The former is involved in knowledge of "mode 1" type and an ethos of CUDOS type; the latter is involved in knowledge of "mode 2" type and an ethos of post-CUDOS type. Robert Merton (1973) named CUDOS and it is mostly adaptable to "academism sciences" in the traditional academia (Merton 1973; Arimoto 1987).

Summarizing the above, we can recognize the structural development from A1 to A2 (Table 12.1) as follows: the social change = transformation from post-industrial society to knowledge society; value = from unified to diversified; knowledge = from "mode 1" to "mode 1" plus "mode 2"; ethos = from CUDOS to post-CUDOS; the enterprise = community of knowledge to enterprise of knowledge; academic work = research paradigm to reconstruction of knowledge; the academic profession = from particularism to universalism; the reward system = from ascription to achievement; the academic ranking = from the US type to the International type.

The academic ranking which this chapter discusses in the given structure of the framework can be separated into two stages: The first stage is A1, in which the

Table 12.1 Structure of A1 and A2

Criteria	A1	A2
Social change	Post-industrial society	Knowledge society
Value	Unified	Diversified
Knowledge	Mode 1	Mode 2
Ethos	CUDOS	Post-CUDOS
Organization	Community of knowledge	Enterprise of knowledge
Academic profession	Particularism	Universalism
Academic work	Research paradigm	Scholarship reconsidered
Ranking	US type	Worldwide type

ranking was undertaken nationally in the academic marketplace in the USA, that started in the second half of the twentieth century and stressed research orientation and productivity for the first time. The second stage is A2, in which the academic ranking was undertaken internationally in a global academic marketplace from around 2003. These two stages have imposed differences to the point that the ranking in the first stage mostly affected academics in the USA and stimulated their reactions to it, while the ranking in the second stage affected academics elsewhere. The academic professions worldwide, who comprise "the small worlds, different worlds" Burton Clark identified would be expected to respond to the academic rankings differently according to the systems, cultures, climates, and disciplines to which they belong (Clark 1987).

12.2.2 Knowledge Production and Research University

Knowledge is conceived to be quite important to the study of higher education from the perspective and methodology of the sociology of science (Merton 1973; Becher 1981, 1989; Clark 1983, 1995, 2008; Jacob and Hellstrom 2000; Becher and Parry 2007; Bleiklie and Henkel 2005; Kogan et al. 2006; Parry 2007; Arimoto 1981, 1987, 2007). The knowledge function consists of discovery, dissemination, application, and control, and in other words it means research, teaching, service, and administration, and management, respectively. Among these functions, research, teaching, and service make up academic work, which is identified as the most important function in the activities of universities and colleges (Clark 1983; Arimoto 1981, 2005). In academic work, research and teaching are thought to be the main functions for the academic profession. In particular, academics are engaged in "academic productivity" which Michiya Shinbori distinguished from "scientific productivity" as used by Robert Merton (Merton 1973; Shinbori 1973). Academic productivity mainly consists of research productivity and teaching productivity (Arimoto 1981, 2005).

Academic productivity is perceived to have a logic of connecting itself with the concept of "center of learning" (COL), or "center of excellence" (COE), when it has high visibility in terms of quantity as well as quality (Ben-David 1977; Arimoto 1996). In fact, universities attracting many prominent academics with high productivity form centers of learning. Other distinguished researchers and teachers tend to move to these centers, if possible, once they have gained recognition.

Paris and Bologna were universities with characteristics of COE in the early Middle Ages because of their reputation for teaching productivity rather than research productivity. The mobility of teachers and students toward the COE institutions at that time, when no indicators and methodologies existed to evaluate academic productivity, was thought to be in response to the reputation of the Universities. On the other hand, in the COE institutions in modern universities, initially found in German universities where research was institutionalized, the reputation for research productivity has become more important than teaching productivity. As a result, it is there we can observe the beginnings of a research paradigm and also the appearance of a research marketplace mechanism.

Following the establishment of Berlin University in 1810 and the institutionalization of scientific knowledge in German universities, the "research paradigm" emerged, with a focus on discovery of knowledge and the relationship of the COE conforming to research productivity.

A comparative study of "eponymy" testifies that the COEs were in Germany in the nineteenth century (Ruffner 1977; Shinbori 1985; Arimoto 1996). The COEs were in France and the UK in seventeenth to eighteenth centuries, in Germany in the nineteenth century, and in the USA in the twentieth century. Many researchers and students were sent to these centers from all over the world, returning with many experiences of culture, academic climate, and ethos to their native countries. As a result, research productivity became a greater priority internationally as well as nationally. This research orientation and productivity went from Germany to the USA where it has subsequently been encouraged to a great degree.

During the nineteenth century, approximately 8,000 students were sent to German universities from the USA (Oleson and Voss 1979). Some graduate schools such as Johns Hopkins, Clark, Harvard, Yale, and Princeton that were established in the second half of the nineteenth century were involved in importing the German style of research orientation. They promoted competition for German-type academics by paying considerable attention to scientists, scholars, and researchers with outstanding research productivity. Preeminent universities such as Harvard, Yale, and Princeton started to change from colleges for liberal arts education to universities for research and professional education by recruiting researchers holding doctoral degrees (Pierson 1952).

Some other countries including Japan sent their own students to the centers of learning throughout the world, especially Germany, importing a model of research orientated to their own countries (Nakayama 1978).

As described above, both the US universities and the academics reacted swiftly to catch up with the level of academic productivity of the German universities, and engaged in the series of academic reforms described below.

12.2.2.1 Curriculum Reforms

The introduction of an elective system by Charles W. Elliot, President of Harvard University, promoted a transformation from the old style of "recitation" to a new style of "teaching through research." It was almost the same at Yale and George Pierson described it as follows: "Many criticized the old college curriculum because it was too narrow or elementary. Especially, the men who had been trained in Germany wanted to introduce the German ideals of free teaching and free study, of lectures rather than recitations, and of specialized investigation and research" (Pierson 1952: 45). It was an epoch making event in American higher education resulting in the fact that research has become the basis of teaching.

12.2.2.2 Restraint of Inbreeding in Harvard University and Yale University

Universities such as Johns Hopkins and other institutions with high research productivity no longer recruited their own graduates but Ph.D. holders as academic staff. Pierson described the situation at Yale: "In 1908, the Alumni Weekly printed a statistical summary which revealed that from 1801 to 1877, Yale College has appointed only one non-Yale man to a professorship. From 1877 to 1900, a broader policy had introduced a nucleus of outside talent, without sensibly threatening the established order. And since 1900, more than half the professorial appointments and more than one-third of the junior appointments had gone to graduates of colleges other than Yale"(Pierson 1952: 291). This represents a dramatic paradigm shift from the teaching orientation, dating back to the universities of the Middle Ages, to the research orientation of the Modern universities.

The shift away from hiring their own graduates started from that time and has continued for more than a century until today. Harvard, which introduced the German research orientation model, became a pioneer in promoting the research paradigm. The efforts of conducting academic reforms have lasted for many years since then. An example is provided by Keller and Keller, who wrote in 1953, "Nearly half of the 448 members of the Faculty of Arts and Sciences had Harvard Ph.D." That the Harvard habit of promoting from within was declining was shown by the fact that "Of 68 senior appointments between 1953 and 1957, more than half came from other schools; only six had come up through the College, the Harvard Graduate School, and the Junior faculty. The inbreeding ratio at this time was controlled as low as 5% among all academic staff."(Keller and Keller 2001: 211).

The most important strategy for a research university to increase its competitiveness is to recruit researchers with high research productivity. Harvard is controlling its inbreeding ratio at a low level, even though it is the leading US institution producing the best and brightest graduates. It is understandable that the restraint of inbreeding is necessary to become a competitive institution in terms of research productivity. By contrast, the University of Tokyo, which is thought to be an equivalent to Harvard in terms of prestige among Japanese institutions, had high inbreeding ratios of 90% in 1965 and 80% in 2005 (Shinbori 1965; Arimoto 1981; Yamanoi 2007). This fact indicates that it has had no explicit philosophy of controlling inbreeding in the century since its establishment.

12.2.2.3 Institutionalization of the Graduate School

The German research orientation was realized by its transplantation to a graduate tier, which was newly established for the first time in higher education, replacing the undergraduate tier which had lasted for about eight centuries since the Middle Ages. The graduate school was established in Johns Hopkins University in 1876 as a base for research as well as for professional education, and other influential universities including Clark, Harvard, Yale, Princeton followed (Brubacher and Rudy 1968: 183). The Ph.D. became a sort of "union card" for entry to an academic career (Veysey 1965: p. 176). Academic rank was introduced in Chicago University in 1891 in order to more effectively recruit and promote academics. Academic ranks consist of three grades and eleven classes: chief professor; professor; associate professor; assistant professor; instructor; associate; assistant; docent; lecturer; reader; and fellow (Rudolph 1962: p. 398). A new academic career was institutionalized to promote from fellow to professor under the pressure of competition. Research universities gradually emerged from these graduate schools and their research functions.

12.2.2.4 Some Reforms Such as Establishment of Academic Associations, Sabbatical Years, and University Presses

Academic associations coped well with the research orientation from inside and outside academia. A system of sabbatical years was started by Harvard in 1880 with a 7-year interval in order to increase research productivity. Academics were expected to publish books and articles after spending more or less than a year absent from teaching. In addition, a university press was founded by Johns Hopkins in 1881 and a series of university presses including Chicago, California, Princeton, Yale, and Harvard were founded to publish Ph.D. dissertations. As a result, a research orientation was further promoted (Rudolph 1962: p. 407).

Many other countries have attempted to respond to the German type of research orientation. Their efforts have not been as effective as that of the USA where many reforms were carried out to achieve the goal. Japan is not exceptional in its inadequate responses. Catching up with the level of science in other advanced countries has become a national policy in Japan for more than a century from the Meiji Restoration until today. The national government and academics have sought to evaluate the COE formed internationally in the different academic disciplines.

First, with the establishment of Tokyo Teikoku Daigaku (University of Tokyo), the academics tried to introduce the strongest disciplines and departments as developed in advanced countries. This is evidence of their fairly accurate insight into the centers of learning in the world at that time. For example, they selected the following disciplines from advanced countries as early as 1870: from the UK: mechanics, business methods, geology, architecture, and shipbuilding; from France: law, international law, biology, census, astronomy, physics, chemistry, and architecture; from the USA: mail systems, industrial arts, agriculture, farming, commerce, and mineralogy (Nakayama 1978: 42–43).

As Shigeru Nakayama pointed out, in the early Meiji years, the government and the academics decided to import scientific knowledge from the West, designating the advanced countries to invite prominent researchers and teachers. They sent students to these selected countries after asking them to study languages before leaving Japan (Nakayama 1978: 45).

Second, while they invited researchers and teachers from these advanced countries they did not introduce similar reforms to control inbreeding. Unlike the USA, they did not invite prominent scholars from other universities in Japan to participate and thereby controlling the inbreeding ratio. Accordingly, it was inevitable that extension of prestige stratification led to an increase in the inbreeding ratio (Arimoto 1981; Yamanoi 2007).

Third, they sent many students overseas to the COEs. This is a sign that they sought to catch up with the scientific standards of the centers of learning in the advanced countries. However, at that time there was a great gap between the advanced countries and Japan as shown in the fact that Erwin von Bälz, who was invited in 1876 to Tokyo Medical School (University of Tokyo), wrote in his diary: "Japanese students tend to get ripe fruits from the tree of science instead of the spirit of its roots that produce them" (Bälz 1979).

At that time, students were still involved in "recitation" of materials taught by their teachers without thinking about them critically. This method is almost similar to that used in Harvard College in the early nineteenth century when student's recitation was popular as described by Pierson (1952: 45). This method had been in place for many years before an elective system was introduced into Harvard, and many innovative reforms in teaching and learning methods were not successful for a long time in the University of Tokyo and other institutions (Ushiogi 1984).

As shown above, both Japan and the USA paid attention to the German model of research orientation but Japan was not successful in establishing graduate schools as well as the universities to provide a research orientation. With hindsight, one could have predicted fairly easily more than a century before that Japan would remain well behind the USA in the future ranking order when the global institutionalization of academic rankings commenced in the twenty-first century

12.3 Academic Contexts of University Ranking

12.3.1 Ranking in the USA

From an international perspective, the first academic ranking was undertaken in the USA in 1925, when a simple form was used in the field of sociology, and again in 1960 when an improved one was introduced (Arimoto 1981: 132–138). There are clearly reasons for the initial institutionalization of ranking in the global academic community.

First, the research and science orientation had already been established before the introduction of academic ranking. The new emphasis on supporting a research orientation, which had been developed in German universities, was institutionalized in the academic community in the late nineteenth century, replacing the old value of emphasizing the teaching orientation that had been in place for almost six centuries since the Middle Ages.

Second, the institutionalization of the graduate school occurred separately from the undergraduate college because of its connection to a research orientation. The first step in this reform was made in 1876 by Johns Hopkins University, followed by Clark University in 1887, and the University of Chicago in 1892, which was successful in forming both a graduate school and a research university. "The establishment of Johns Hopkins was perhaps the single, most decisive event in the history of learning in the Western hemisphere" (Shils 1979: 28).

Third, an academic departmental system was developed so as to promote academic productivity. Although it was originally developed on the basis of "departmentalism," in which control of an academic guild is established in the chair (Clark 1983), the basic unit of the research orientation in German universities was an institute in natural sciences and a seminar in humanities and social sciences on the basis of the chair system. The counterpart in the US universities was a department with a focus on a research orientation instead of the chair system which was not imported into the USA. As a result, it is thought that the department system is more likely to stimulate research productivity than the chair system (Clark 1983).

Fourth, based on these trends, the competition for pursuing quality assurance at the individual department level was promoted to the extent that culture and a climate for quality evaluation of academics was increasingly encouraged in the individual department. To define the quality of a department, various organizations and methodologies were invented at the same time: the organization for publication such as academic journals and the university press; the organization for assessing academic productivity such as academic associations; and the methodology for promoting publication in terms of economy and time such as sabbatical years (Rudolph 1962: 407).

Fifth, we can point to a social climate in the 1880s, when Henry Rowland made a comparison between Germany and the USA in physics, emphasizing research orientation. He proclaimed the need for construction of the best science institutions instead of "a cloud of mosquitoes" type of institutions. "Best science required an institutional pyramid, commanded at the heights by a best-science elite and open to talent at the bottom" (Clark 1983: 257).

Such reasons are thought to have worked well related to the appearance of academic ranking in the USA at an early stage of modern university history.

Thus, some significance can be attached to the fact that institutionalization of academic rankings was first undertaken in the USA.

First, the fact that ranking started about half a century ago reflects the operation of a market mechanism among institutions as well as individual academics so as to promote a priority competition for academic productivity. This anticipated the situation today when academic ranking is gradually extending over the global academic community accompanied by such priority competition.

Second, specific universities are apt to be situated at the top of the hierarchy. For example, in the case of departments of sociology in graduate schools, the top ten are as follows (Arimoto 1981: 136): in 1925, Chicago, Columbia, Wisconsin, Minnesota, Michigan, Harvard, Missouri, Pennsylvania, North Carolina, and Yale; in 1957, Harvard, Columbia, Chicago, Michigan, Cornell, Berkeley, Minnesota, North Carolina, Washington (Seattle), and Yale; in 1970, Berkeley, Harvard, Chicago, Michigan, Wisconsin, North Carolina, UCLA, Cornell, Johns Hopkins, North Western, and Princeton. In all the departments, including departments of sociology in the US university system, the research universities are apt to form the upper stratum of the hierarchy. As argued by Parsons and Platt, the function of knowledge discovery has the highest prestige in academic work in American academia (Parsons and Platt 1973).

It has taken many years to create such a structure in the USA, since the establishment of Johns Hopkins University with its graduate school. As mentioned above, many universities, including Harvard, tried to reform their organizations by the recruitment of distinguished academics (and students), by the reinforcement of inbreeding, the establishment of departmentalism, and the institutionalization of a university press. Through these reforms, some institutions were gradually transformed from colleges to universities, eventually forming the top-ten group in the ranking order. For example, Morton and Phyllis Keller pointed out that Harvard with a score of 63 was placed at the top of the hierarchy in 1937 in their scores of the 28 fields of GSAS(Graduate School of Arts and Sciences) , followed by Chicago (121), Columbia (126), Yale (157), California (189), Johns Hopkins (199), Cornell (234), Princeton (242), Michigan (245), and Wisconsin (250) (Keller and Keller 2001: 110).

Through these processes, some were ranked by a science index as top-science institutions by Hugh Graham and Nancy Diamond who identified the top 20 leading public and private research I and II institutions in the 1990s (Graham and Diamond 1997: 109); public institutions: UC Berkeley, UC San Diego, Wisconsin-Madison, Colorado, SUNY-Stony Brook, Purdue, Illinois-Urbana, UCLA, Utah, and Arizona; private: Caltech, MIT, Rockefeller, Princeton, Stanford, Brandeis, Cornell, Harvard, Johns Hopkins, and Chicago.

It is important to acknowledge Vanervar Bush's efforts to create an American academic structure comparable to the German academic structure of the early twentieth century (Bush 1945). Much money was also invested in research universities by the US federal government and by private foundations (Geiger 1986, 2004). Responding to these trends, the research universities developed the US type of research orientation of about 200 institutions as defined by the Carnegie classification (Carnegie Commission on Higher Education 1976). The inclusion of about 200 research universities in a system makes it perhaps the largest one in the world, because in Japan, for example, it was approximately 25 institutions in 1980, when the Carnegie classification was adapted to the Japanese institutional situation (Amano 1984).

Third, both upward and downward mobility among institutions are recognizable. This is apparent in the previous data, in which, for example, Chicago declined from the top to a lower position, while Harvard moved up from sixth to the top position. Thus, examples of both "retention" and "scrap-and-build" have remained in the series of rankings.

Fourth, research universities, highly ranked in the hierarchy pyramid attract academics with high research productivity. Jonathan and Stephen Cole identified four types of academics based on a combination of their quantity and quality of research productivity: prolific (+ +), mass productive (+ −), perfectionist (− +), and silent (− −) (Cole and Cole 1973: 92). Jones, Lindzey, and Coggeshall undertook a survey in 1982, ranking the top 50 departments in various fields including mathematics and physical sciences, biological sciences, engineering, social and behavioral sciences, and humanities (Jones et al. 1982). The author of this chapter conducted a survey in 1987 of 287 chairpersons who belonged to the top 50 departments ranked by Jones et al. The results indicate that while there are many academics of high quality productivity in high ranking departments, there are few in low ranking institutions. The 228 respondents reported that as many as 82.8% of their staff achieved high quality productivity. On the other hand, in non-high-ranking departments the proportion fell to 44.3%. It is also interesting to note that in the top ranking departments, the "silent type" constitutes 9.9%, and is less than the 35.7% in non-high ranking departments (Arimoto 1994: 27–47). In the top ranking institutions, academics pursue high productivity both in terms of quantity as well as quality.

Fifth, ranking is a reflection of the academic marketplace, which is working of a priority competition for academic productivity among institutions and academics internalized an ethos of science and research orientation. In other countries such as Japan where a market mechanism is working less positively and "sponsored mobility" is working rather than "contest mobility," an environment of academic ranking has barely been developed.

Sixth, a principle of meritocracy which emphasizes academics' research achievement is operating, in addition to evaluation and reward systems which also emphasize a research orientation. In other words, an "eponymy principle" stressing competition in Merton's ethos of science, or CUDOS, consisting of communality, universalism, disinterestedness, organizational skepticism, and competition is working to evaluate and reward research achievements produced by the academics as researchers (Merton 1973).

Seventh, institutionalization of academic rankings in the USA functioned as a starting point leading to the internationalization of academic rankings which was initiated in 2003 when agencies such as THES, Shanghai Jiao Tong University, and World News and Report engaged in an academic ranking enterprise with worldwide scope. We, therefore, predict the beginning of international competition among the systems and the institutions. In fact, many countries, including Japan, have become involved in the "rat race": In Japan, the government initiated the twenty-first century COE program in 2002 and the Global COE program in 2008. Similarly in South Korea, there is the World Class University Program, and in China, the 985 project in 1998 (MEXT 2006, 2007; Altbach and Umakoshi 2004; Arimoto 2010a).

12.3.2 Ranking in the World

As has been discussed already, a prototype of worldwide academic ranking emerged about 100 years after it was instituted in the USA. It is important to examine several issues related to this trend, since it is likely to lead to significant differences from what preceded it.

First, the new trend is evident in that the academic community is more and more involved in an international market mechanism. The reputation of institutions as gained in the marketplace has always functioned partly in the realm of the US academic marketplace, but now it is broadly functioning across the world. As a result, ranking has increased its visibility and impact.

Second, the importance of research productivity has increasingly developed together with the internationalization of a "research paradigm." Various kinds of indicators have been used to assess research productivity in addition to those previously used. These include awards such as the Nobel Prize, international awards like the Field Medal, the Albert Lasker Medical Research Award, the Max-Planck-Medaille, the Louisa Gross Horwitz Prize, and John Bates Clark Medal; SCI (Science Citation Index); Eponymous titles as in the Doppler effect, Newton's law, Boil's law, and Mendel's law; scholarships like the Heisenberg Plan, and the post-doctoral program.

As a result, a separation between research and teaching has developed rather than an integration between them, which it is functioning to reduce academic productivity as a linkage between research productivity and teaching productivity. In this context, how to promote such integration and linkage has become a problem to be resolved as soon as possible (Arimoto 2006a, b, 2010a).

Third, the expansion of the academic community beyond internationalization caused by globalization has substantially accelerated a unification of national academic marketplaces. Ranking, which has a close relationship with the shift of COE, creates a huge pyramid of the worldwide academic community beyond national borders. Of course, it is true that the pyramid consists of a variety of components, since the shift of COE occurs according to its deferring levels such as system (country), institution, organization, individual academic, and discipline.

Fourth, related to the first viewpoint, increasing the visibility of the COE brings about a quantitative clarification so that competition intensifies among institutions existing on the status of their COE until the high possibility of scrap-and-build in the process of forming COE is recognized. This kind of trend intensifies competition among not only institutions but also countries so that the emerging countries are forced to participate under the same conditions as advanced countries. Evidence for this is seen in the fact that South Korea and China, both of which were thought to be peripheral to the COE for a long time, are now catching up with more advanced countries in terms of research productivity.

For example, the frequency at which a paper is cited is indicated by the "relative citation impact" (RCI) on the basis of the source. This is compiled by MEXT based on the Thomson Scientific, National Science Indicators, 1981–2006 (Standard version). By country, the RCI is as follows: the USA (1.47), the UK (1.36), Germany (1.21), Canada (1.19), France (1.09), Japan (0.90), South Korea (0.67), China (0.58), India (0.50), and Russia (0.47). Japan's impact has remained low (under 1.0), while those of the UK, Germany, and France have steadily moved upward, approaching that of the USA. Moreover, South Korea and China together with India and Russia have also been basically showing upward trends (MEXT 2008: 55).

Fifth, a market mechanism will intrude on the academic community in accordance with an increasingly intense recruitment of scientists, researchers, and academics with high visibility and reputation, by the ambitious institutions seeking to form the centers of learning. In this process, the growth of both “brain gain” and “brain drain” is internationally recognizable. The separation between research and teaching previously mentioned has progressed so that far more attention is paid to talented academics with high research productivity than to those with high teaching productivity.

Sixth, it has become an increasing problem that the reliability of academic ranking is being questioned (Kobayashi et al. 2005). We fear some indicators used for the evaluation of research productivity are oriented toward the West due to the fact that advanced countries such as the USA and the UK usually occupy higher rankings.

Seventh, the effects of ranking as a result of seeking to achieve COEs have moved from Germany to other countries including Japan via the USA. It is undeniable that the effects are both positive and negative. There are many examples of positive effects: acceleration of research orientation in academia; development of indicators to be used for research productivity; development of evaluation methodologies for research productivity; increase in research productivity in institutions as well as by academics; stimulus for national policy to raise research productivity by way of programs such as the twenty-first century COE program, the Top 30 program, and the World Class University program; social development through scientific development; scrap-and-build in the social stratification of institutions; academic drift and mobility among institutions; and reduction of inbreeding and academic nepotism.

On the other hand, as examples of negative effects we can point to such things as: differentiation of society between “haves” and “have-nots”; separation between research universities and non-research universities; the increase of the research paradigm and the decline of a teaching orientation; the acceleration of application market mechanisms and academic capitalism; a harmful influence of over competition on academics; and an increase of the social pathology of deviant scientific behaviors such as forgery, plagiarism, and fraud.

12.4 Impacts of University Ranking on Academics

12.4.1 Impacts on the Academic Professions

The emergency of academic ranking at an international level in the early twenty-first century has had many effects on various aspects of the academic world including systems, institutions, organizations, and the academics themselves. For example, we can point out that the London Times’ ranking published in 2009 caused the following severe shocks.

Examining academic ranking by country, we are able to see both the USA and the UK are ranked at the top of the hierarchy as expected. This is directly related to the history of these two countries in having formed centers of learning for a long time.

Examining academic ranking by region, we can observe that the centers of learning are monopolized by the West, followed by other regions such as Asia, Latin America, and Africa, though these other regions are considered to be peripheral. For example, among the top 100 institutions, the share of the English speaking region, such as the USA, the UK, and Canada, amounts to as much as 67%. Among all institutions, 39 are from Europe, 16 are from Asia, of which the Chinese speaking region, such as Taiwan, China, and Hong Kong, has six institutions (London Times 2009). These data show that the centers of learning formed by advanced countries in the West over a long period are still reflected well in the recent ranking structure.

Further, it is clear that the social stratification is observable at each level of world, region, system, and institution. At the regional level, for example, leading countries are recognizable: the USA and the UK in the West; Japan in Asia, etc. This implies that centers of learning are formed in every region.

In the case of Japan, for example, it is well represented, although it does not belong to the top level of ranking. Thirty Japanese institutions are ranked within the top 600, which corresponds to only 4% of the 770 universities and colleges in Japan. Yet, we would expect 40 if we accept that the ratio of research universities should be 5% (MEXT 2009). As far as the distribution by sector is concerned, 15 of those listed are in the national sector (17.4%), 8 in the private sector (1.3%), and 3 in the public sector (3.5%). The fact that only six institutions, including the University of Tokyo, Kyoto University, Osaka University, Tokyo Institute of Technology, Nagoya University, and Tohoku University, all of which belong to the national sector, are ranked in the top 100, leaves much to be desired.

12.4.2 Academic Productivity by Country

Analyzing academic productivity by country, we can recognize the following noteworthy traits.

12.4.2.1 Rapid Progress of an Academic Drift over 15 Years

Making a comparison of academic productivity in terms of publication by country in the CAP survey of 2007, we can get a ranking with regard to total research productivity (Table 12.2). The top ten consists of South Korea, Japan, Italy, China, Germany, Hong Kong, Norway, Argentina, Canada, and Malaysia. Various items are used in assessing research productivity: publication of book, edited book, article, report, newspaper, patent, computer software, artistic creation, film, and others. Taking the book and the article as examples, we can observe that they have different

Table 12.2 Average productivity in every item by country

	Book	Edited book	Article	Report	Paper	Newspaper	Patent	Computer programs	Artistic	Films	Others	Total
Argentina	0.58 (7)	0.36 (6)	4.45 (14)	2.22 (3)	6.76 (7)	1.52 (6)	0.03 (17)	0.11 (7)	0.40 (5)	0.06 (16)		22.2 (8)
Australia	0.28 (17)	0.19 (18)	6.89 (7)	1.40 (10)	5.79 (9)	1.06 (12)	0.08 (10)	0.08 (14)	0.36 (7)	0.08 (13)	0.18 (15)	18.3 (12)
Brazil	0.55 (8)	0.27 (13)	5.54 (13)	1.53 (7)	5.50 (10)	1.66 (3)	0.04 (15)	0.08 (17)	0.30 (10)	0.16 (6)	0.93 (1)	19.5 (11)
Canada	0.35 (16)	0.28 (12)	6.21 (8)	1.42 (9)	8.16 (1)	1.33 (8)	0.08 (9)	0.11 (6)	0.23 (12)	0.09 (12)	0.62 (2)	20.1 (9)
China	0.83 (4)	0.79 (1)	8.56 (4)	1.32 (11)	2.60 (18)	0.86 (15)	0.30 (4)	0.32 (1)	0.14 (17)	0.07 (15)	0.06 (16)	26.7 (4)
Finland	0.41 (15)	0.36 (9)	5.36 (12)	1.22 (12)	4.67 (15)	1.38 (7)	0.07.(13)	0.10 (11)	0.31 (9)	0.06 (17)	0.35 (11)	17.9 (15)
Germany	0.41 (12)	0.48 (5)	8.76 (3)	2.23 (2)	7.00 (6)	1.62 (5)	0.33 (2)	0.12 (5)	0.41 (4)	0.19 (1)	0.39 (8)	26.4 (5)
Hong Kong	0.48 (10)	0.45 (7)	9.56 (2)	1.64 (6)	7.71 (2)	2.16 (1)	0.20 (5)	0.09 (12)	0.22 (13)	0.12 (9)	0.34 (12)	26.2 (6)
Italy	0.94 (3)	0.48 (4)	8.56 (5)	1.66 (5)	7.52 (3)	1.72 (2)	0.11 (8)	0.09 (13)	0.08 (18)	0.10 (11)	0.26 (14)	29.7 (3)
Japan	1.47 (1)	0.45 (6)	8.54 (6)	1.03 (15)	4.81 (14)	0.92 (13)	0.30 (3)	0.05 (18)	0.68 (2)	0.07 (14)	0.00 (17)	31.3 (2)
South Korea	1.03 (2)	0.65 (2)	10.16 (1)	2.63 (1)	7.15 (5)	1.09 (11)	0.61 (1)	0.10 (8)	0.33 (8)	0.05 (18)	0.50 (5)	36.0 (1)
Malaysia	0.60 (6)	0.33 (10)	4.15 (16)	1.45 (8)	5.95 (8)	0.83 (16)	0.15 (6)	0.10 (9)	0.18 (16)	0.17 (4)	0.38 (9)	19.6 (10)
Mexico	0.41 (13)	0.20 (16)	2.36 (18)	0.56 (18)	3.19 (17)	1.19 (10)	0.04 (16)	0.17 (3)	0.51 (3)	0.17 (2)	0.49 (6)	11.5 (18)
Norway	0.55 (9)	0.26 (14)	5.74 (11)	0.73 (17)	4.91 (13)	1.63 (4)	0.07 (12)	0.09 (15)	0.29 (11)	0.14 (8)	0.58 (4)	18.0 (14)
Portugal	0.65 (5)	0.54 (3)	5.74 (10)	1.78 (4)	7.44 (4)	1.29 (9)	0.12 (7)	0.21 (2)	0.38 (6)	0.17 (3)	0.40 (7)	24.6 (7)
South Africa	0.46 (11)	0.20 (17)	2.84 (17)	0.78 (16)	3.43 (16)	0.62 (18)	0.03 (18)	0.09 (16)	0.22 (14)	0.16 (7)	0.27 (19)	12.9 (17)
UK	0.40 (14)	0.32 (11)	6.05 (9)	1.10 (14)	5.45 (11)	0.78 (17)	0.06 (14)	0.15 (4)	0.20 (15)	0.12 (10)	0.38 (10)	18.0 (13)
USA	0.24 (18)	0.21 (15)	4.26 (15)	1.11 (13)	5.41 (12)	0.89 (14)	0.08 (11)	0.10 (10)	1.23 (1)	0.16 (5)	0.59 (3)	14.6 (16)
Total	0.61	0.21	4.26	1.11	5.41	0.89	0.08	0.1	1.23	0.16	0.59	14.6

Source: Daizen 2010)

Notes: Average productivity is calculated by weighting different academic outputs and aggregating the scores: 10 points for each book; 5 points for edited book; 1 point for each book chapter or journal article; 3 points for each research report; 0.5 points for each paper presented to an academic association, patent, computer, artistic activity, or film; 0.3 points for each newspaper article; others are not included in the total of average productivity ranking orders: For the book, the order of the top five is Japan, South Korea, Italy, China, and Norway, while for the article, the order is South Korea, Hong Kong, Germany, China, Italy, and Japan. In comparison, in the 1992 survey, the top ten consisted of Japan, the Netherlands, Sweden, Germany, Chile, Israel, the USA, the UK, Brazil, and Australia (Arimoto and Ehara 1996: 172).

In the overall ranking, South Korea has achieved a major breakthrough moving from 11th in 1992 to the top in 2007. The reason for this successful outcome is probably due to a series of national projects such as the first BK21(1999–2005) and the second BK21(2006–2012). As far as the outcome of the former is concerned, quantitative and qualitative enhancement of research is shown in the fact that the number of articles counted by SCI (Science Citation Index) doubled from 3,765 in 1998 to 7,281 in 2005, and in the same period, national ranking of SCI up from 18th to 12th. An impact factor of SCI in the field of science and technology increased from 1.9 in 1999 to 2.43 in 2005. Taking into account the WCU (World Class University) project (2008–2012), which was introduced in 2008 after the CAP survey was conducted in 2007, we expect to see an even more successful outcome in the future (Umakoshi 2010: 75–95).

12.4.2.2 Japan is Keeping a High Ranking

The huge increase in South Korea's ranking has displaced Japan to the second position. While productivity in Japan may well have been affected by a series of structural changes (see below), the disciplinary bias in sampling, which over-represents the medical sciences, may also be a contributory factor. In other words, the sampled share of each disciplinary area is as follows: Humanities (13.5%), Social sciences (13.6%), Natural sciences (18.8%), Engineering (24.5%), Medical sciences (22.7%), and Teacher training (7.0%). It follows that sampling is the second highest in the medical sciences following engineering in Japan, and in an international comparison of share, Japan is the highest in this disciplinary composition when compared with Australia (19.3%), Brazil (18.5%), Norway (17.8%), Germany (15.6%), etc. As Table 12.3 shows, Japan has the highest productivity in the medical sciences with a score of 51.5 so that both high percentage and productivity in this field seem to be significant when we note Japan is keeping its high ranking.

12.4.2.3 Emergence of Italy, China, Norway, etc. as New Faces

Of the 18 countries participating in the 2007 survey, Italy has achieved a high rank. Italy, China, and Norway did not participate in the survey in 1992. Germany's research productivity provides a remarkable contrast with that of the USA and the UK, although these three countries have been highly ranked COE members for a long time. Germany established the original COE in the nineteenth century and since then has maintained a high position until today. It is interesting to note that Germany had a high ranking productivity in both the 1992 and 2007 surveys,

Table 12.3 Average research productivity by discipline and country

	Humanities	Social sciences	Natural sciences	Engineering	Medical sciences	Teacher training	Total
South Korea	32.2 (1)	34.6 (1)	35.3 (1)	41.3 (1)	47.6 (2)	31.4 (2)	36.0 (1)
Japan	21.8 (9)	24.9 (5)	26.6 (4)	26.5 (5)	51.5 (1)	26.5 (3)	31.3 (2)
Italy	30.5 (4)	29.3 (2)	26.1 (5)	30.9 (3)	39.3 (4)	36.6 (1)	29.7 (3)
China	25.7 (6)	28.3 (3)	25.1 (8)	28.4 (4)	27.0 (7)	22.9 (7)	26.7 (4)
Germany	30.8 (3)	27.5 (4)	26.7 (3)	20.1 (10)	28.8 (6)	28.8 (5)	26.4 (5)
Hong Kong	20.2 (11)	18.9 (11)	31.2 (2)	39.3 (2)	38.2 (5)	24.4 (4)	26.2 (6)
Portugal	26.7 (5)	21.8 (6)	25.7 (7)	23.9 (8)	39.6 (3)	15.5 (13)	24.6 (7)
Argentina	32.0 (2)	20.3 (7)	19.6 (11)	17.0 (14)	22.5 (10)	22.9 (6)	22.2 (8)
Canada	17.1 (16)	18.3 (13)	21.0 (10)	24.8 (7)	23.8 (8)	21.3 (9)	20.1 (9)
Malaysia	23.1 (8)	19.8 (8)	25.9 (6)	15.0 (16)	15.6 (16)	21.7 (8)	19.6 (10)
Brazil	23.7 (7)	17.7 (15)	21.2 (9)	19.4 (12)	19.0 (12)	16.7 (12)	19.5 (11)
Australia	18.6 (12)	19.6 (9)	17.4 (13)	20.0 (11)	17.8 (13)	16.8 (11)	18.3 (12)
UK	17.4 (14)	18.5 (12)	19.4 (12)	20.9 (9)	15.7 (15)	11.1 (18)	18.0 (13)
Norway	20.3 (10)	19.4 (10)	14.6 (16)	16.9 (15)	20.1 (11)	18.9 (10)	18.0 (14)
Finland	17.9 (13)	18.1 (14)	16.0 (15)	17.3 (13)	23.2 (9)	14.1 (14)	17.9 (15)
USA	13.0 (17)	12.2 (18)	17.2 (14)	25.1 (6)	16.9 (14)	11.6 (17)	14.6 (16)
South Africa	12.2 (18)	16.4 (16)	11.6 (18)	7.0 (18)	5.4 (18)	12.5 (15)	12.9 (17)
Mexico	17.2 (15)	13.1 (17)	12.5 (17)	7.1 (17)	11.0 (17)	11.6 (16)	11.5 (18)
Total	22	20.8	22.3	22.7	26.6	19.2	22.2

while in the London Times ranking, only four German institutions are ranked within the top 100, far fewer than their counterparts in the USA and the UK (London Times 2009).

On the other hand, in the CAP survey of research productivity, both the USA and the UK are ranked far lower than expected. In analyzing the results of the 2007 survey, we find that Germany is ranked within the top five, while both the USA and the UK are ranked 16th and 13th, respectively. In the individual categories for books published, the rankings are 18th and 14th, respectively, and for articles 9th and 15th, respectively (Table 12.2). These two countries therefore revealed surprisingly low research productivity in the 2007 survey, which was based on academics' responses to questions about research productivity rather than on an external review undertaken in the London Times survey. Incidentally, in the 1992 survey, the UK was at 8th and the USA was at 7th position (Arimoto and Ehara 1996). Why is their productivity low? Probably, it is a reflection of the small sampling of academics from the group of research universities in the CAP survey.

12.4.2.4 Academics' Increasing Commitment to a Research Orientation

In the 1992 survey, three groups were distinguished with regard to academics' orientation toward research and teaching: a German type, an Anglo Saxon type, and a Latin type (Arimoto and Ehara 1996). The German type consists of countries such as Germany, the Netherlands, Sweden, South Korea, and Japan, characterized by a strong research orientation. The Anglo Saxon type consists of countries (and a region) such as the USA, the UK, Australia, Hong Kong, and Taiwan, showing almost equal orientation to both research and teaching. The Latin American type consists of countries such as Brazil, Argentina, Chile, and Russia, characterized by a strong teaching orientation.

The recent data (2007) show that in both the Anglo Saxon type and the Latin American type, there is an increased orientation to research, with a diminished teaching orientation (Arimoto 2010a). This trend means in part that there will be a large growth in the German type within 15 years and indicates the increasing effect of international academic ranking on the much greater involvement by academics in research orientation throughout the world. It follows that this trend obviously implies a converse effect on the integration of research and teaching.

12.4.3 Academic Productivity by Structural Factors

Even if the research productivity of the Japanese academic is still high according to the quantitative data shown above, it may still be declining. In other words, due to a series of changes in higher education policies undertaken continuously over the past 15 years, which has brought about a separation between research orientation and teaching orientation, the research orientation in Japan appears to be gradually weakening. This trend is contrary to the Humboldtian ideal of integration of research and teaching (Von Humboldt 1910; Boyer 1990; Clark 1997; Ushiogi 2008; Arimoto 2010a). As a result, it has caused a type of anomie in the realm of academics' consciousness, in the sense that there is a widening discrepancy between research and teaching rather than an integration between them.

For example, there have been a series of policies to reinforce this situation as follows (UC 1998; CEC 2005; Arimoto 2007, 2010b, c):

- A system-level measure by way of the Science and Engineering Basic Law (1995) and Planning (1996).
- Higher education policies with a focus on the COE program, the Top 30 program, and a teaching-oriented type of Faculty Development (FD). By introducing these policies, a differentiated society appeared in the academic community with a widening discrepancy between research universities and non-research universities.

Parallel to this trend, academic productivity, consisting of both research productivity and teaching productivity, has declined considerably. The effect of this disintegration of research and teaching, instead of an integration between them, will become more evident in the future, because academic ranking is based on research orientation rather than teaching orientation as is shown in the trends of many of the countries participating in the CAP survey (Arimoto 2010a). An extension of this trend in the future is likely to cause further segmentation both among institutions and among academics.

The reaction of the academic profession is worthwhile noting because academics belong to a range of social groupings such as those identified as system, sector, section, tier, hierarchy, status, age group, or gender which must define their specific responses. That the results of the London Times and the CAP survey do not converge is natural when we consider the many differences in academics' reactions. Both surveys deal with academic productivity, especially research productivity. In the London Times, research productivity is defined by an external evaluation using various indicators, while research productivity in the CAP is defined by an internal evaluation on the basis of the consciousness of the academics who respond to the questionnaire. Such consciousness is, as it were, a collaboration of the various factors of system, institution, sector, section, etc. to which the individual academic belongs. These factors are each examined below.

12.4.3.1 System

The number of higher education systems may well equate to the number of countries. Some of them are in advanced countries and some are in developing countries. It is assumed that advanced countries are likely to be positive toward the increasing productivity rate because the concept of the COE is familiar to these systems on the basis of either having the centers of learning, or of seeking to become centers of learning in the future. Conversely for the developing countries, it is less likely to be positive because the concept is thought to be less familiar to their systems. Those systems that already have centers of learning are likely to realize high academic productivity, but it is interesting, as the CAP survey reveals, that the centers of learning in the USA, and the UK are not necessarily ranked highly in the CAP, possibly because of biased sampling.

12.4.3.2 Sector

In many countries, the higher education system is divided into two or more sectors. In Japan, the system is divided into three sectors: the national, the public, and the private sector. The national sector is accorded the highest prestige, followed by the public sector and the private sector. In the USA., there are two categories: the state and the private sector. In general, the private sector is considered to be more prestigious than the public. In Germany, the state sector prevails almost exclusively with several states sharing a largely equivalent prestige (Arimoto 1996). In the UK, the public sector has the highest prestige, with Oxbridge at the top, and this structure is similar to that of France and Japan (Clark 1983). In South Korea, there are two sectors with Seoul University at the top, and in China, multiple sectors form a hierarchy headed up by Beijing University and Tsinghua University.

In the London Times survey, we can recognize the correlation between the high ranking institutions and their ranking in every country. In the case of Japan, for example, all the institutions ranked within the top 100 are in the category of research universities in the national sector. To become a high ranking institution, a research university clearly needs to be connected to the national sector.

12.4.3.3 Section

The category referred to as section relates to the academic discipline, since the section consists of faculty, department, and chair on the basis of discipline. Disciplines in the field of the natural sciences tend to have a well-developed scientific codification so that clear standards are used to assess the quality of academic productivity. Physics provides a typical applied example of this (Zuckerman and Merton 1971). By contrast, the humanities and social sciences tend to have a less developed scientific codification so that the quality of academic productivity is frequently assessed by ambiguous standards. As a result, it is not surprising that the natural sciences are apt to have an international orientation, while the humanities and social sciences will have more of a local orientation. For example, articles in the natural sciences are usually written in English – a language common to the international academic community. Conversely, an article written in Japanese is unlikely to be read by researchers or scientists in the international academic community.

The humanities and social sciences are more likely to be committed to the cultures and traditions particular to their individual countries, or local regions. Academics in these disciplines often write articles in the languages familiar to those cultures and traditions. In Japan, there are many academic journals serving these disciplines which are published by universities and colleges. Many academics contribute articles in Japanese. These articles receive very little attention by foreign scholars who do not read Japanese, even if these articles are of a high quality, comparable to that of a COE in line with international standards. Accordingly, international recognizable ranking is more easily attained by Japanese academics in the field of natural sciences compared to their counterparts in humanities and social sciences (Arimoto 1994).

It may be said that the value of "universalism" is working in the natural sciences, while "particularism" is working in the humanities and social sciences. This appreciable difference in impact may explain the high productivity of Japanese academics in the natural sciences, and especially in medical sciences. As has already been discussed, over-sampling of academics in this section in addition to their outstanding productivity appears to have been a major factor in raising the average productivity of all Japanese academics to that of second best ranking according to the CAP survey.

12.4.3.4 Tier

Tier indicates the level of the academic and intellectual program and has a close relation to the stratification of knowledge. The level of difficulty of content in a discipline is described as beginning, intermediate, or advanced. Such content difficulty is aligned with curricula in the schools as well as the universities and colleges whether it is elementary school, middle school, senior high school, or university and college. In the case of universities and colleges, the content difficulty of the curricula is higher in the postgraduate level than that in the undergraduate level, because the former has a closer connection with advanced research than the latter. Therefore, we assume that academics in the postgraduate tier are likely to be very conscious of ranking, and in particular those in the research universities. They are not only conscious of the ranking system but also know the exact global locations of the COE.

12.4.3.5 Hierarchy

Hierarchy is a social stratification incorporating the academics, institutions, and systems that form around a discipline and extend from its COE to the periphery. As discussed above, the hierarchical structure is likely to be unitary in the natural sciences, but likely to be pluralistic in the humanities and social sciences. In terms of academic productivity, an institution can become the COE if it attracts many prestigious researchers in a specific discipline. The earlier description of the Departments of Sociology in the USA is one example of this. In similar systems such as those of the USA and the UK, many institutions are capable of becoming COE.

Such COEs can be identified by various indicators, and ranking is actually a result of the application of these indicators. It is no exaggeration to say that ranking occurs in a hierarchy, in which usage of indicators substantially changes the given ranking as well as the given hierarchy. Currently ranking is based on the structure that weights research productivity higher than teaching productivity. The same ranking would not be seen if the weight were predominantly on teaching productivity rather than research productivity.

In a recent (2010) conversation with a professor at the University of Paris in France, he suggested that the reason why only two French institutions are in the top 100 of the London Times ranking is that they operate according to different values from those that influence the ranking. Historically, French universities focused on teaching, while the academy focused on research (Clark 1983; Arimoto 1996). The USSR and, at an early stage, China imported the French system in which the weight on teaching differed from that in American and British universities where they attach special importance to research and teaching. Hence, one can understand why French universities may pursue structurally different academic productivity from that of the Anglo Saxon environment.

12.4.3.6 Hierarchy of Position

There is also a hierarchy of position which relates to academics' social stratification. A professor's prestige and academic productivity are thought to be high whenever promotion is based on competition. Accordingly, professors are most susceptible to ranking during their academic careers, knowing the significance of the ranking. In this climate, junior academics, who are engaged in competition with senior academics, seek to enhance their own academic productivity.

Academics aspiring to upward mobility are clearly responding positively to academic ranking. Academics, particularly full professors, who climb to the highest ranks in the "pyramidal type" of professoriate population in Western universities and colleges, are thought to be sensitive to academic ranking. In contrast, full professors in the "chimney type," or reverse pyramidal type, of Japanese universities and colleges, are thought to be less sensitive. About 40 years ago, in Western universities in countries such as the USA, the UK, Germany, and France, the ratio of professorial to junior positions reflected the pyramidal type and this is still the case today. As Morikazu Ushiogi has pointed out, in Japan it was a chimney type, categorized by Michiya Shinbori 40 years ago, but it has changed to the reverse pyramidal type today (Shinbori 1965; Ushiogi 2009).

12.4.3.7 Research Money from Outside Academia

Research money is one of the most important factors influencing the academic profession's reaction to ranking. It is difficult to improve academic productivity without research money. One reason why academics in the USA are competitive in research productivity may well lie in the culture, climate, and atmosphere of its society generally as well as in academia. The relationship between society and academia is based on a market mechanism operating at a level in the USA, well ahead of that in any other countries.

The connection between academia and research money from outside is strong. Research money from outside is the highest in the USA (0.380), followed by South Korea (0.337), and Japan (0.308), while in the UK (0.232) and Germany (0.141) it is lower (Table 12.4). It is perhaps surprising to find that German academics have high productivity with less outside money than the total average (0.165), while South Korean and Japanese academics have high productivity with considerable outside money. However, it is even more surprising that American academics have lower productivity despite the fact that they receive the highest level of outside money.

12.4.4 Academic Productivity by Faculty Factors

12.4.4.1 Ph.D. Degree

In the academic environment, the Ph.D. degree has become the "union card" as described earlier, and it is also related to high research productivity. The degree is seen as valuable for recruitment and promotion to higher ranks but what about its effect on productivity? Table 12.4 shows that in all countries, Ph.D. holders are more productive than other degree holders. This trend is typical of Japan (36.0%).

12.4.4.2 Age

Age is generally associated with a hierarchy of position. In general, junior academics occupy positions in the lower levels of the hierarchy, while the senior academics occupy higher positions although at times there are exceptions to this. In a system in which both promotion and upward mobility are frequently related to competition and selection processes, academics are forced to take academic ranking into account. On the other hand, in a system not driven by these mechanisms, the academics can be less influenced by ranking.

In the pyramidal structure, the situation is competitive; this is far less so in the chimney type and the reverse pyramidal structure. The cluster of research universities in the U.S. is highly competitive in the promotion process since it corresponds to the pyramidal type, while the counterpart in Japan is less competitive since it retains the characteristics of a reverse pyramid type. American academics are inclined to respond far more positively to academic ranking than Japanese academics. Academics over the age of 40 years are more productive than those under 40 years in the five countries listed in Table 12.4. As far as these data are concerned,

Table 12.4 Characteristic of total productivity by country

Country	Productivity (total)	Gender M.	Gender F.	Over 40	Under 40	Degree Dr.	Degree (others)	Research money
South Korea	35.3 (1)	34.1 (1)	40.2 (1)	36.2 (1)	32.4 (1)	28.8 (4)	20.5 (4)	0.337 (2)
Germany	26.7 (3)	28.6 (3)	19.4 (8)	33.6 (3)	14.0 (14)	31.2 (2)	8.0 (17)	0.141 (12)
Japan	26.6 (4)	26.6 (7)	24.0 (5)	27.8 (7)	17.9 (7)	36.0 (1)	20.1 (5)	0.308 (3)
UK	19.4 (12)	20.8 (11)	16.2 (14)	20.9 (13)	14.7 (13)	17.9 (15)	4.4 (18)	0.232 (8)
USA	17.2 (14)	17.3 (15)	17.2 (11)	17.7 (16)	15.1 (12)	24.7 (10)	17.5 (7)	0.380 (1)
Total (18 countries)	22.3	23.7	19	25	16.6	24.7	17.5	0.165

Japanese academics are productive in both generations, despite the existence of the reverse pyramidal model.

12.4.4.3 Gender

The significance of a gender in relation to ranking lies in the fact that inequality exists between men and women in the academic profession. Japanese female academics are proportionately fewer in the total population of academics than their counterparts in other countries. It follows that they are disadvantaged in the processes of establishing their status. By contrast, American female academics have a greater advantage in the recognition of their status.

Once they have obtained a higher status, female academics are able to take on many more opportunities to participate in research productivity at the international level. As shown in Table 12.4, female academics' productivity (19.0) is lower than the male academics' productivity (23.7), when data from 18 countries are compared. This is also true for countries at an individual level. For example, in Japan, female productivity is 24.0 where as the male productivity is 26.7. A similar trend is seen in Germany, the UK, and South Korea, however, is exceptional in that female productivity at 40.2 is higher than male productivity at 34.1. In the USA, both genders show almost the same productivity. It follows that female academics in South Korea and the USA are making positive contributions to academic ranking.

The situation of female academics in the USA has changed dramatically. They had a significantly lower status until 50 years ago. The ratio of female academics employed at Harvard University in 1959–1960 remained low at all professional levels and especially at the position of full professor (Keller and Keller 2001: 278) (Table 12.5). Affirmative action was introduced in 1976 and the ratio still remained low though no legal control had existed before that time of 1959–1960. It is clear that up to that time, opportunity for female academics was extremely limited even in one of the most progressive institutions in the USA.

As has been discussed, the attitude and reactions of the academic profession toward academic ranking are not simple to establish, because they are affected by many factors. Taking this into account, we can expect to approach this theme by making a combination of these factors in the next step of research in the future.

Table 12.5 The ratio of female academics employed at Harvard in 1959–1960

Position	Total	Women
Professor	427	4 (0.9%)
Associate professor	118	8 (6.8%)
Assistant professor	299	8 (2.7%)
Instructor	529	52 (9.8%)
Lecturer	196	28 (14.3%)
Research staff	769	107 (14.7%)
Teaching fellows	597	76 (12.7%)
Clinical (HMs)	236	8 (3.4%)

12.5 Concluding Remarks

This chapter has dealt with many problems related to the main theme, by analyzing the following issues and drawing conclusions.

1. Academics are engaged in functions of knowledge, especially research—as the discovery of knowledge and teaching-as the dissemination of knowledge; and their outputs of research and teaching productivity. Academic productivity is an integration of these two functions, and is the most important role the academic profession is expected to pursue in the age of transformation from A1 to A2.

   By paying attention to academic productivity, we can realize the formation of COEs and their condition, structure, and function. A center of learning was built on the teaching and productivity reputation of institutions and academics in the medieval universities. In modern universities, by comparison, it has been built on research productivity. This seems to suggest that a research paradigm has prevailed in the academic community since the institutionalization of German universities in the nineteenth century.
2. American universities established graduate schools in the nineteenth century at the A1 stage when they imported the German model. They enhanced their research productivity to become the major COEs in the world. In order to be able to invite distinguished scholars to their staff, they controlled inbreeding and academic nepotism as much as possible. At the same time, they attempted a series of academic reforms in order to enhance research and raise research productivity.

   On the other hand, many countries failed to introduce similar reforms. Japanese universities paid a great deal of attention to German universities, inviting prominent scholars to visit and also sending students abroad. However, they were not successful in introducing reforms leading to high research productivity, having encouraged inbreeding rather than controlling it for many years.
3. In the USA, universities as well as academics responded positively to the institutionalization of academic ranking. The reason lay mostly in their competitiveness which sought to catch up with and exceed Germany's high level of research productivity. There was considerable competition among departments for a primacy ranking. This trend introduced ranking into the academic marketplace for the first time, stimulating academic drift between institutions and a scrap-and-build attitude toward institutional ranking.

   Based on this trend, the research universities strengthened their positions in the academic marketplace and realized higher positions in the hierarchy of higher education institutions. Accordingly, the academic ranking introduced in the USA in the A1 era was a foretaste of what was to come with the start of the A2 era in the twenty-first century.
4. Emergence of worldwide academic ranking is establishing a hierarchy of higher education institutions as a unified pyramidal structure around the world, in which the West-centered structure focused on the USA and the UK is prevailing. As a result, some positive and negative effects have occurred in the academic community.

5. There is a difference between objective and subjective evaluation in academic ranking. For example, the USA and the UK, which are ranked highly by the London Times and other surveys, are ranked lower when compared against the 18 countries of the CAP survey.

   An objective evaluation usually emphasizes research rather than teaching, and research productivity rather than teaching productivity. Both research and teaching are indispensable in the academic community. Nevertheless, the fact that a teaching orientation has decreased and a research orientation has increased in the CAP survey suggests a close relationship to the emerging worldwide academic ranking.

   An emerging academic ranking is affecting in manifest and latent function level the consciousness of the academic profession and also national higher education policy. The academics in South Korea and some other countries have responded positively to this kind of trend over the past 15 years. In Japan, the quality of academic productivity is slowing down, even though academics have constantly maintained a high level of productivity over the past 15 years. The reason is attributable to the effects of conflicts between the academics' traditional research orientation and the national government's higher education policy, demanding all academics to improve their teaching orientation.
6. The reactions of the academic profession to academic ranking are caused by various factors: system, sector, section, tier, hierarchy, hierarchy of position, age, and gender. Consequently, the reactions of the academic profession to academic ranking are complicated. It is said that we can observe the problems, which objective evaluation can hardly understand, through subjective evaluation. However, more detailed observation of the reactions of the academic profession in regard to academic ranking is needed to provide a greater in-depth understanding.

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