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1.1.1 Innovations in university systems and organizations

FUKUI Humitake¹ HAYASHI Takayuki²

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Abstract

A university is a complex organization comprising various academic disciplines and possessing diverse objectives in education, research, and social services. Given their complexity, universities are affected by higher education policy, as well as science, technology and innovation policy, and industrial policy. Universities are also one of the key actors influencing policy implementation. As such, how to make universities more qualitatively advanced is an important issue in national strategy. After summarizing the role of universities in science, technology and innovation policy (Section 1), this paper discusses changes in the environment surrounding the university system (Section 2) and innovation within the university system and organizations (Section 3).

Keywords

Diversification of universities, knowledge-based society, university classification, world-class universities, evaluative state, university organization, academic capitalism, corporate universities

1 The role of universities in science, technology, and innovation policy

1.1 The diverse functions of universities

Universities are believed to have originated with teachers and student guilds (*universitas*) in Bologna and Paris around the twelfth century. However, the main function of universities at that time was to teach law

¹ Associate Professor, Kamakura Women's University; Visiting Researcher, Columbia University (formerly Assistant Professor, National Graduate Institute for Policy Studies).

² Professor, National Graduate Institute for Policy Studies.

and theology, and thus cannot be said to have always had research functions (Haskins 2001; Perkin 2006). Founded in Germany in 1810, the University of Berlin played an important role in bringing research functions into university mandates. At the University of Berlin, it was emphasized that universities should play a leading role in the development of the German nation through the creation of new knowledge. This modern German research university model subsequently spread to other countries (Geiger, 2015). Land grant universities, established in the United States in the late nineteenth century, were founded on land provided by the federal government through the Morrill Land Grant Act of 1862 with the objective of contributing to the development of agriculture, engineering, and other fields. Providing public service through knowledge and technology transfer soon became one of the university's core functions (Altbach, 2001). As such, while the functions of universities have changed between countries and over time, education, research, and social services (including knowledge transfer) have emerged as their primary functions. However, there are limits to viewing universities with a single model. For example, in the former Soviet Union and China before the 1980s, research functions were mainly performed by research institutes established outside universities (Liu, 2007). Moreover, not all universities possess education, research, and social service (including knowledge transfer) functions.

Nonetheless, regarding the university as a single entity encompassing the three aforementioned functions and then envisioning how each of these functions will affect one another affords an effective perspective when creating a university system. Indeed, even when examining the relationship between education and research, the two can produce synergies that help—or hinder—each other (Ben-David 1977). Table 1 summarizes the relationship between the three main functions of universities: research, education, and knowledge transfer (Geuna and Rossi, 2015). As Table 1 shows, universities have different functions that affect one another; it is here that policies and university management that break away from limited perspectives are necessary.

Table 1: The relationship between education, research, and knowledge transfer (positive and negative aspects). Source: Geuna and Rossi (2015, p. 33)

	Research	Teaching	Knowledge Transfer
Research		<p><u>Positive effect from research to teaching</u></p> <ul style="list-style-type: none"> • Improvement of the quality of teaching • Continuous improvement of their professional knowledge <p><u>Negative effect from research to teaching</u></p> <ul style="list-style-type: none"> • Incentives work to increase research productivity at the expense of education • Recruiting faculty without adequate aptitude of education 	<p><u>Positive effect from research to knowledge transfer</u></p> <ul style="list-style-type: none"> • Enhancing the effectiveness of knowledge transfer by involvement of original research • Facilitating the transfer of tacit knowledge
Teaching	<p><u>Positive effect from teaching to research</u></p> <ul style="list-style-type: none"> • Improvement of research productivity realized by specialization offered by respective talents in research and education of faculty members • Recruiting students as academic professionals <p><u>Negative effect from teaching to research</u></p> <ul style="list-style-type: none"> • Less time available for research • Recruiting faculty with limited abilities and adaptability for research 		<p><u>Positive effect from teaching to knowledge transfer</u></p> <ul style="list-style-type: none"> • Promoting the synergy with outside actors by improvement of communication skills in terms of science knowledge • Strengthening the networks with firms by OB/OGs
Knowledge Transfer	<p><u>Positive effect from knowledge transfer to research</u></p> <ul style="list-style-type: none"> • More efficient communication of research results • Identification of commercially promising research topics • Identification of inspiring research solutions leading to advancement of sciences • Access to complementary skills and facilities • Achieving more research enabled by increased awareness and resources inputs <p><u>Negative effect from knowledge transfer to research</u></p> <ul style="list-style-type: none"> • Less time available for research • Incentives work to emphasis on applied and incremental projects • Incentives work to conceal research results or delay publication 	<p><u>Positive effect from knowledge transfer to teaching</u></p> <ul style="list-style-type: none"> • getting attractive ideas and case studies for useful activities • Good opportunity for students to launch startup • Securing additional funding to enable investment in educational innovation <p><u>Negative effect from knowledge transfer to teaching</u></p> <ul style="list-style-type: none"> • Less time available for teaching • Declining education standards • Student activities are used privately 	

1.2 The role of universities in science, technology, and innovation policy

Universities contribute to innovation through education, research, and knowledge transfer. Although emphasis is typically placed on the creation of new knowledge through the research function, and its socioeconomic return, Geuna and Rossi (2015) reviewed the contributions of universities to economic development through various means within each function. Such contributions include the training of highly skilled professionals; the creation and dissemination of social sciences knowledge such as management, organization, strategy, and marketing; the creation of spin-off companies; industry-university collaboration; the employment of recruiters in companies; the renewal of facilities and equipment; the generation and dissemination of new knowledge and technology; access to valuable equipment and facilities; protection and management of old technologies, equipment, bibliographies, videos, and manuscripts; the revitalization of the cities in which they are located; contribution to local culture and sports communities; and the creation of social networks among students, graduates, faculty members and others involved.

Through these means, the university brings technological development, maintenance, the renewal of human resources and tangible assets as direct effects. Such effects include improving the productivity of human resources, the ability of enterprises to adapt to technology, and the ability of enterprises to introduce new products and processes; hiring highly specialized personnel; and renovating facilities. The improved performance of economic institutions is also an indirect effect. For example, universities can improve policymakers' capabilities, increase social capital, and educate people about health, political participation, and civic responsibility.

2 The environment surrounding the university system and various factors promoting change

2.1 Expansion of the university sector

One aspect of the social background that has necessitated the transformation of universities is the expansion of the university sector itself. Given their multifunctional nature, universities are faced with a variety of issues, including the quality of education and research, administration, finances, recruitment and careers of faculty members, admissions, curricula, teaching methods, and industry-academia collaboration. Rather than treating them as separate issues, Trow (1973) attempted to explain these changes using an integrated framework. In doing so, Trow defined existing university systems in society; for instance, those with an enrollment rate of up to 15 percent of the corresponding age demographic were defined as elite universities, those from 15 percent to 50 percent as mass universities, and the remaining 50 percent as universal-access type universities. According to Trow (1973), the popularization of universities transformed not only educational activities, but the relationship between society and universities, university business management, and administrative and financial systems. For instance, the finances supporting universities are a typical problem. As universalization advances, so the question arises as to who should provide the funds to support education and research activities, and where scarce government resources should be allocated among the various sectors of higher education.

2.2 Society's expectations of universities

Over the past twenty to thirty years, expectations of the role that universities should play in society have expanded significantly. This is due to the fact that society is shifting to a knowledge-based society with the advancement of information technology, internationalization, and globalization. Innovation policies and higher education policies to promote a knowledge-based economy and society have been adopted by various countries and international organizations on the basis of these phenomena (OECD, 1996; UNESCO, 2005; Jun Ohba, 2011).

A variety of similar terms have been used to present the vision of a society in which knowledge replaces labor and capital as the main element of socioeconomic development since the 1960s (e.g., Drucker 1969; Bell 1973). Economists have used the terms "knowledge economy" and "knowledge-based society," while sociologists have used the terms "knowledge society," "knowledge-based society," and "learning society." Within this concept of a knowledge-based society, the generation, transmission, and dissemination of knowledge are the main factor in the development of both a country and the world economy, and individual workers are required to change jobs, specializations, and constantly update their knowledge during the course of their careers.

Universities are recognized as important actors within this context. They are required to produce knowledge through traditional research activities, transfer knowledge, and generate and disseminate knowledge in collaboration with various actors outside universities. In terms of human resource

development, there is a need to respond to the mass of students resulting from the knowledge-based society in order to expand lifelong learning functions and shift teaching methods to independent learning, in which students learn to “continue to continuously learn” (Välilmaa and Hoffman, 2008).

3 Innovations in the university system and university organizations

3.1 Innovation in the university sector

Adapting NPM to the university sector

As society’s expectations of universities grow, so the relationship between the university sector and government, as well as that between universities, is changing. A major change in this respect is the adaptation of New Public Management (NPM) to university policy. NPM is generally characterized by (1) separating the planning and implementation of policies, (2) competitive selection of implementing parties, (3) delegating authority to devise implementation methods to implementers, and (4) evaluating implementers based on their performance and results.

A typical example of (1) is making universities independent of the government, as in the case of the incorporation of national universities and some public universities in Japan. Such policies have also been implemented in countries like South Korea and France. Changes have also been made to make university organizations more autonomous, such as by allowing them to reorganize and change their decision-making structures of their own accord.

Examples of the implementation of (2)–(4) include the evaluation of university performance and the allocation of government funds—especially general funding from the government to universities—based on the results of such evaluations. A pioneering example of this is the Research Assessment Exercise (RAE) in the United Kingdom, which became the Research Excellence Framework (REF) in 2014. According to the OECD (2010) and Hicks (2012), at least thirteen countries or regions—namely, the UK, Spain, Slovakia, Hong Kong, Australia, Poland, Italy, New Zealand, Belgium (Flanders), Norway, Sweden, Denmark, and Finland—have begun using indicators and assessments to allocate lump-sum grants. In the United States and Germany, each state allocates a portion of grants based on various indicators. In Japan, national university corporations are evaluated and part of their operation subsidy is allocated based on the results of that evaluation.

NPM has transformed the role of the government from controlling universities through financial investment and regulating them by law to an “evaluative state” (Neave, 1988) that indirectly guides national goals through the evaluation of output, whereby the government does not control universities’ goals, but rewards them by evaluating the quality of various outputs. In response, each university is now required to clarify its own functions and goals, formulate strategies, and clarify the priorities of its various functions in relation to various stakeholders besides the government, such as industry and students.

Diversification and categorization of universities

Another issue that has arisen with the expansion of the university sector is how to categorize and organize diversified universities. In particular, categorization is needed as a conceptual device in science and technology policy when considering to which universities to prioritize the allocation of research funds from grants.

In Europe, the terms “mission diversity” and “mission differentiation” have been used to classify universities and differentiate their functions. Universities and non-university vocational higher education institutions have historically coexisted in many European countries, which means that there has been diversity from the outset. However, in the UK, polytechnics were upgraded to universities and centralized in 1992. Meanwhile, in European countries, the Bologna Process—an effort to standardize the various degree systems in each country—has resulted in universities and other higher education institutions legally awarding equivalent degrees. In terms of research activities, vocational higher education institutions have expanded their research activities in areas close to industrial applications, resulting in the differences between them and universities becoming clearer. It has thus become necessary to use data to analyze universities’ characteristics and achievements after the fact. Consequently, there is a need for vertical diversity, such as classification according to the quality of education and/or research within a certain index (e.g., university rankings), and horizontal diversity, which presents the profiles of universities’ different orientations according to multiple indicators (Teichiler, 2005). For example, in Europe, efforts have been made to create multidimensional rankings, such as U-Multirank (Van Vught, 2008).

In the US, the Carnegie Council on Policy Studies in Higher Education developed the Carnegie Classification in the 1970s as a typology of universities to provide an overall picture of the expanded higher education sector. Although minor revisions have been made since then, the criteria for the Carnegie classification were basically formulated on the basis of objective indicators such as the number of degrees conferred, and for the purpose of organizing diverse universities in a simple way. The classification criteria were revised substantially in 2005, and new classification frameworks such as undergraduate education programs, graduate education programs, student information, undergraduate program information, and size and environment were proposed, in addition to the existing basic university classification.

In Japan, the categorization and functional differentiation of the university sector has been policy-driven, with the keywords of “individualization” and “functional differentiation.” In recent years, the 2005 report of the Central Council for Education, “A Vision for the Future of Higher Education in Japan,” identified seven functions of universities: 1) global centers of research and education, 2) training of highly specialized professionals, 3) training of a wide range of professionals, 4) comprehensive liberal arts education, 5) education and research in specific specialized fields (e.g., arts, physical education), 6) regional centers of lifelong learning opportunities, and 7) social contribution functions (e.g., regional contributions, industry-academia-government collaboration, international exchange). The report also proposed functional differentiation through self-selection by universities.

In 2016, MEXT introduced a system to classify national universities into three categories: Centers for Regional Revitalization and the Prioritization of Specific Fields, Priority Centers for Specific Fields, and

World-Class Centers for Education and Research, with operating subsidies allocated accordingly. In respect to university categorization, the creation of world class universities has become a national issue, particularly in emerging countries (Altbach, 2001). Salmi (2009) identified the components of a world-class university as (1) a concentration of outstanding students and faculty, (2) a rich teaching environment and abundant resources to support cutting-edge research, and (3) good governance that fosters strategic vision, innovation, and adaptability, and allows for decision-making and resource management without being bound by bureaucracy. The government can take measures to create this, including (1) upgrading a small number of existing universities with latent potential, (2) promoting the integration of multiple existing universities to create synergies, and (3) creating new universities (Table 2). In 2017, Japan launched a measure to designate national universities expected to conduct education and research activities according to the world’s highest standards as designated national university corporations.

Table 2: Costs and benefits of a strategic approach to the creation of world class universities

Conditions	Approach		
	Upgrading existing institutions	Merging existing institutions	Creating new institutions
Ability to attract talent	Difficult to renew staff and change the brand to attract top students	Opportunity to change the leader - ship and to attract new staff; though existing staff may resist	Opportunity to select the best (staff and students); difficulties in recruiting top students to “unknown” institution; need to build up research and teaching traditions
Costs	Low	Medium	High
Governance	Difficult to change mode of operation within same regulatory framework	More likely to work with legal status different from that of existing institutions	Opportunity to create appropriate regulatory and incentives framework
Institutional culture	Difficult to transform from inside	May be difficult to create a new identity out of distinct institutional cultures	Opportunity to create culture of excellence
Management for change	Major consultation and communication campaign with all stakeholders	“Normative” approach to educate all stakeholders about expected norms and institutional culture	“Environmentally adaptive” approach to communicate and socially market the new institution

Source: Salmi (2009, p. 48)

3.2 Innovation in university organizations

The peculiarities of university organizations

Along with the transformation of the university sector as a whole, transformation is also underway within universities at the organization level. Earlier research on university organization theory has noted the limitations of simply introducing corporate management methods into university organizations, and the need for change based on the peculiarities of university organizations (Birnbaum 1988; Kezar 2001).

Kezar (2001) identified thirteen characteristics of university organizations as follows. Universities are () interdependent organizations influenced by the actions of external organizations such as governments and

evaluation bodies, making it difficult for them to make independent decisions; (2) on the other hand, they have traditionally been autonomous and relatively independent of the socioeconomic environment. Universities (3) have an organizational culture¹ that is highly characteristic of academia. They are organizations (4) united by long-term missions; (5) in which there are shared beliefs throughout the organization, but also in which different beliefs coexist. Universities (6) have multiple structures of power and authority; (7) are loosely coupled systems; (8) are loosely coupled, interdependent organizations with multiple power and authority structures, resulting in anarchical organizational decision-making. They also (9) have differences in values, which are emphasized by faculty and administrators. Universities (10) exhibit loosely coupled, decentralized decision-making through shared governance, and are (11) characterized by long tenure of employees in one organization. They also (12) have ambiguous organizational goals, and (13) place managerial emphasis on organizational image. Of course, not all of these characteristics apply to all universities, but organizational innovation that takes these characteristics of university organizations into account is required.

The corporatization of universities

Even taking into account the peculiarities of university organizations, amidst the environmental changes set out in the previous section, universities have adopted corporate-style management, and come to struggle to secure financial resources through the provision of education services and the acquisition of research functions. This kind of situation has been described using several names, such as “academic capitalism” (Slaughter and Leslie, 1997) and the “entrepreneurial university” (Clark, 1998; HATA Takashi, 2004). According to Clark, a corporate university is one that actively seeks to make changes to how it conducts its activities. The following five factors are characteristic of such universities: (1) strengthening the core of operations, such as leadership and management authority; (2) developing alongside organizations surrounding the university (TLOs and educational linkages with startups); (3) holding discretionary funds; (4) promoting a central place in the university for entrepreneurial activities; and (5) spreading entrepreneurial beliefs in the university.

The evolution of research management in universities

The management of research activities in universities has also undergone significant changes (Connell, 2004; Hazelkorn et al., 2005). The importance of universities’ research function is increasing, with universities required to compete to acquire research funds from a variety of sources and allocate funds appropriately within the university, as well as conduct interdisciplinary research that transcends organizational boundaries and requires large equipment. Universities must also attract and retain talented people and train young researchers in insecure employment. As such, university research management thus exhibits several common trends as follows (Connell, 2004). Research management in universities is

¹ Bimbaum (1988) proposed four models of university organizational culture: collegial culture, bureaucratic culture, political culture, and anarchical culture.

becoming increasingly specialized, with many universities have senior positions such as vice presidents in charge of research, as well as specialists in research management (URAs). This involves the formulation of a strategic research plan, systematically prioritizing important research areas and issues, allocating funds, evaluating the quality of research within the university, and commercializing the results of research. They must also nurture researchers' careers, systematize the education of doctoral students and postdoctoral fellows, teach transferable skills for non-academic careers, and maintain faculty members' contribution to the university by continuously improving their skills.

4 University policy in recent years

Finally, I would like to outline some of the major policy trends in the Japanese university sector in recent years. Largely spurred by the recommendations made by the Provisional Council on Education to deregulate universities and introduce private sector activity in the 1980s, Japanese university policy has promoted expanded autonomy for universities and the fostering of a competitive environment based on this autonomy (Ohba, Jun, 2009). In particular, the broadening of university establishment standards in 1991 substantially relaxed various regulations on the development of aspects like the university curricula, and promoted the free implementation of education and research by universities on their own accord. A series of university reforms were subsequently accelerated as part of a major trend in regulatory reform around 2000, shifting from *ex ante* regulation to *ex post* checks. During this period, a series of institutional reforms were implemented, including the relaxation of the approval system for the establishment of private universities (2003), establishment of specialized graduate schools (2004), incorporation of national universities (2004), and establishment of the accreditation system (2004).

In particular, one of the major turning points in the history of the Japanese university system since the Meiji era was the incorporation of national universities in 2004. As a result of this systemic reform, national universities, which had previously been part of the government administrative structure, were given corporate status and became corporations independent of that structure. This has served to strengthen the authority of university presidents; clarified the responsibilities of boards of directors, management council, auditors, and so on; and resulted in the creation of national university management bodies based on institutional self-responsibility and autonomy. In financial terms, autonomy was promoted through the abolition of the existing special account for national schools and the allocation of operating subsidies as block grants. However, while the government provides the majority of funding for university operation and facility maintenance, the operating subsidy is subject to an efficiency factor, which has been gradually decreasing since the shift to incorporation. National university corporations are also institutionally obliged to establish mid-term plans based on the six-yearly mid-term goals set by the Minister of Education, Culture, Sports, Science, and Technology. The extent to which these plans are achieved is subject to assessment, placing them under the indirect control of the government.

Amid decreasing operating expense subsidies in recent years, competitive subsidy programs have been developed as a policy measure to support the creation of centers of excellence in education and research and the internationalization of universities, and initiatives like the Twenty-first Century COE Program

(launched 2007), the Project for Strengthening Research Universities (launched 2013), the Project for Establishing International Hubs (Global 30, launched 2009), the Project for Supporting the Creation of Super Global Universities (launched 2014), and Designated National Universities (launched 2017) have been promoted.

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