GLOBAL PERSPECTIVES ON HIGHER EDUCATION

How World-Class Universities Affect Global Higher Education

Influences and Responses

Ying Cheng, Qi Wang and Nian Cai Liu (Eds.)

SensePublishers

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Volume 30

Higher education worldwide is in a period of transition, affected by globalization, the advent of mass access, changing relationships between the university and the state, and the new technologies, among others. *Global Perspectives on Higher Education* provides cogent analysis and comparative perspectives on these and other central issues affecting postsecondary education worldwide.

Series Editor:
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This series is co-published with the Center for International Higher Education at Boston College.

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SENSE PUBLISHERS
ROTTERDAM / BOSTON / TAIPEI

A C.I.P. record for this book is available from the Library of Congress.

ISBN 978-94-6209-819-0 (paperback)
ISBN 978-94-6209-820-6 (hardback)
ISBN 978-94-6209-821-3 (e-book)

Published by: Sense Publishers,
P.O. Box 21858, 3001 AW Rotterdam, The Netherlands
https://www.sensepublishers.com/

Printed on acid-free paper

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ACKNOWLEDGEMENTS

The editors wish to thank Mr Peter de Liefde, Sense Publishers, for his support in the publication of this volume; Professor Philip G. Altbach, Monan University Professor and Director of the Centre for International Higher Education, Boston College; Dr Jan Sadlak, President of IREG – International Observatory on Ranking and Academic Excellence; Dr Paul Deacon for the linguistic editing of the manuscript.

YING CHENG, QI WANG AND NIAN CAI LIU

1. HOW WORLD-CLASS UNIVERSITIES AFFECT GLOBAL HIGHER EDUCATION

Influences and Responses

INTRODUCTION

World-class universities (WCU), commonly recognized as global research universities or flagship universities, are cornerstone institutions embedded in any academic system and play an important role in developing a nation's competitiveness in the global knowledge economy. It is widely agreed that these universities are committed to creation and dissemination of knowledge in a range of disciplines and fields; the delivery of elite education at all levels; serving national needs; and furthering the international public good (Altbach, 2009; Liu, 2009; van der Wende, 2009). The development of world-class universities is high on the policy agenda of various stakeholders across the globe (Altbach & Balan, 2007; Huisman, 2008). Such a "world-class" movement has been fuelled and intensified by the proliferation of international league tables (Salmi, 2009; King, 2011). In the past few years, an increasing number of nations, regions and higher education institutions in both developed and developing countries have joined the same race for academic excellence and have adopted a range of development strategies and implemented various reforms. It was in this context that Graduate School of Education at Shanghai Jiao Tong University initiated the biennial International Conference on World-Class Universities in 2005. Previous conferences have gathered university administrators, government officials, leading scholars and policy researchers from around the world to discuss the various issues related to world-class universities.

The Fifth International Conference on World-Class Universities was held in November 2013. The conference theme was "How World-Class Universities Affect Global Higher Education: Influences and Responses," to provide insights and experiences of building world-class universities from different national and regional perspectives.

GLOBAL IMPACT OF WORLD-CLASS UNIVERSITY MOVEMENT: EXCELLENCE INITIATIVES

Seeking world-class university status has been a global phenomenon in the past decade (Mohrman et al., 2008; Altbach, 2011). Not only in the developed countries but also in those economies in transition, governments have conducted comprehensive reforms to restructure their higher education systems through this

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"world-class movement" (Deem et al., 2008; Altbach, 2009). Such efforts to encourage higher education growth have been witnessed in particular in Asian and European countries and regions. Governments and leading universities in these countries and regions have adopted various strategies and approaches in pursuit of academic excellence. Among these strategies, excellence initiatives, that is, strategic funding programmes, are one of the main policy foci adopted by governments. Selected universities in these countries and regions have been provided extra and concentrated funding to develop excellence in teaching and research.

A few East Asian countries and regions are among the first to implement strategic funding programmes in pursuit of excellence. For example, the mainland Chinese government has adopted a national policy advocating the building of globally prominent universities over the past decade, and has launched a group of specific national initiatives and competitive funding programmes, such as the 211 and 985 Projects (see Chapter 8). The 211 Project aims at developing about 100 universities and a number of key disciplines by the early 21st Century. To further strengthen the development of excellence, the 985 Project, launched in 1998, emphasizes the exploration of new mechanisms for higher education governance and developing a path to transform a selected few top universities into world-class status. Both projects have provided the selected universities with abundant resources to enhance teaching and research quality and with autonomy in institutional governance and management. Challenged by the increasing competition from its neighbouring countries, the Japanese government has put in place policies to foster world-class universities through competitive funding schemes since early 2001, such as the 21st Century Centres of Excellence, the Global Centres of Excellence and the World Premier International Research Centre Initiative (see Chapter 7). Although government and ruling party changes might have led to some alterations in these funding programmes, the orientation to pursue excellence in Japanese universities remains. Similar trends and developments are also taking place in South Korea (the Brain Korea 21, World-Class University Initiatives and the BK21 PLUS project, see Chapter 6), Taiwan (Development Plan for World-Class Universities and Research Centres of Excellence, see Chapter 7), as well as in Singapore (World-Class Universities programme) and Malaysia (Accelerated Programme for Excellence).

One of the earliest strategic funding programmes in Europe was the Excellence Initiative implemented by the federal and state governments in Germany in June 2005 (Chapter 4). This programme intended to enhance research in Germany, to support and promote elite institutions, and ultimately to improve its higher education performance. In addition to its "Plan Campus" Programme, the French government decided to launch a structural support programme – the "Investment Programme for the Future" in 2009 (Chapter 2 and 3) – to boost higher education and research which is "a key sector for the future." Realizing its universities' relatively poor performance in global higher education, the Russian government has initiated a series of reform since the 1990s, including the Innovative University Programme, the Federal Universities Project and the National Research

Universities Initiative. These projects focus on strengthening their research capacity (Chapter 5). At the end of 2012, the Russian president Vladimir Putin signed a decree with the target of at least five Russian universities in the top 100 of world university rankings by 2020. Similar excellence initiatives are also observed in Denmark (Centres of Excellence), Finland (Centres of Excellence in Research), Norway (the Centres of Excellence Scheme) and Spain (International Campus of Excellence).

Despite the different organization and managerial approaches, these initiatives all propose clear aims for excellence, provide adequate funding to a select few institutions and research centres, and ensure essential policy support from government. These initiatives tend to provide relatively long term funding, which ensures continuity and improves the effectiveness of such policy implementation. Furthermore, these competitive funding programmes are proposed, agreed on and legislated by government and its associated organizations. The legislation processes turn these education initiatives into regulations and laws, which strengthen the authoritative and compulsory nature of the policies. In addition, these funding programmes have raised an awareness of international competition among institutions (Wang, 2011).

COMMON ISSUES IN BUILDING WORLD-CLASS UNIVERSITIES

Governments' aspirations to develop world-class universities have accelerated the implementation of "concentration and selection" policies in various countries and regions; however, challenges are inevitable. A range of common issues and problems, in terms of funding, research, market forces, autonomy and accountability, the globalization of science, academic freedom and the academic profession, are universally applicable but with different scope and depth in different countries and regions (Altbach, 2009).

From the perspective of financial resources, with the increasing cost of operating a world-class research-oriented university, many governments have managed to support their leading universities with concentrated funding to promote excellence. However, two issues need to be taken into consideration. On the one hand, in the context of the recent economic crisis, many developed countries have been cutting their public expenditure on education while most developing and transition economics still have fairly low overall education spending as a share of GDP (World Bank, 2012). This leads to the concern: to what extent can the funding of world-class universities be sustainable. On the other hand, while the top end of the higher education system has had significant investment through national initiatives, the other members at the bottom of the systems might not obtain adequate support from the government, which might undermine the overall quality of mass higher education (Altbach & Wang, 2012). Policy makers at national level should ask how many world-class universities are desirable and affordable as a public sector investment (Salmi, 2009).

From the perspective of research and innovation, there is still a trade-off between quantity and quality. For example, while research shows rapid growth in

the number of papers published internationally by East Asian universities, especially those receiving extra funding, there has been limited progress in terms of paper quality reflected by citation data and in terms of leading academic research that has a significant international impact (Marginson, 2011b). Concentrated research expenditure might be one of the elements impacting on intellectual quality, but the research culture and institutional autonomy, as well as academic freedom, are also indispensable (Altbach, 2011; Marginson, 2011a).

From the perspective of governance, how to deal with the tension between autonomy and accountability in the context of the neoliberal economic consensus can be seen as a core issue. It is true that these competitive funding programmes mentioned in the previous section to some extent have further enabled the selected universities autonomy and flexibility to spend according to their demands, while performance criteria are tightly attached to assure accountability and quality (World Bank, 2012). However, in those countries and regions with strong national steering and control, it might be possible that research priorities are decided and shaped by the governments (Altbach, 2009; Marginson, 2011a). Also, in relation to diversifying funding resources, the commercialization of research brings significant challenges: market forces and commercial interests can generate potential conflict between traditional academic norms and commercial interests, and between basic research and applied and often profit-oriented research (Altbach, 2009).

From the perspective of talent concentration, world-class universities require highly trained professors, scholars and scientists devoting their full professional attention to teaching and research. One of the challenges, especially in middle- and low-income countries, is to provide reasonable remuneration and employment security to staff, not only academic but also administrative staff, so as to guarantee their time and work commitment and to guarantee facilities and infrastructure to make their creative research possible (Altbach, 2009). In the "publish or perish" environment, few practices have been instituted for professors to balance their teaching and research responsibilities (Deem, Mok & Lucas, 2008).

From the perspective of national languages, the English language is still dominant in the global academe, for both instruction and research (Altbach, 2011). To engage in global competition, world-class universities must function in the international language of science and scholarship. In spite of the increasing internationalization movement around the world, it will be still a while before scholarship is translated into English on a large scale (Marginson, 2011b). Meanwhile, world-class universities also have responsibilities to develop research to serve the demands of local communities, to disseminate research in their local contexts, and to support and develop local languages (Altbach, 2009).

Despite a common goal and a strategic focus on building academic excellence observed across the globe, it is not difficult to identify different emphases, procedures and mechanisms adopted within these approaches. Altbach and Salmi's research (2011) reiterate that a complete analysis of operating a world-class university needs to take into consideration the context within which institutions evolve, as education reform and changes do not happen in a vacuum. Countries and

those overseeing their higher education systems need to carefully assess their needs, resources and long-term interests, and design their strategies based on their national and institutional models. There is no universal model or recipe for making academic excellence (Salmi, 2009). International experience might be helpful to provide experience and lessons; however, a simple policy copying exercise may not transfer effectively from one country or university to another.

CONTRIBUTIONS TO THIS VOLUME

Reflecting the above points, this volume is composed of two sections: "National and Regional Reflections on Excellence Initiatives" and "Opportunities and Challenges of Developing Excellence."

National and Regional Reflections on Excellence Initiatives

This section particularly focuses on and updates the policy trends and changes in developing world-class universities, addresses factors and concerns that governments need to take into account in making relevant education policies, and discusses the impact of national and regional investment in research and teaching excellence.

Michel Rocard, a former prime minister of France, provides us an insightful story on the excellence funding scheme in France – the "Investment Programme for the Future" (PIA). Directly involved in this policy making, Mr Rocard discusses how such a policy of "concentration and selection" have been proposed, implemented and developed. France's relatively poor performance in various university rankings triggered heated debate on whether France can again be capable of world-class research. The PIA, implemented in 2009, was designed to boost research and higher education in France, and sets out clear goals of only awarding support to innovative projects of excellence, in other words, equality and regional balance are not the policy concerns. It is interesting to note that even with a change of government, this excellence policy was not only respected but extended and intensified. Though it is too early to discuss the impact of the PIA, the early results show increasing enthusiasm to develop both fundamental and applied research, and active collaboration both among universities and between universities and industry. Following Mr Rocard's inside story, Ghislaine Filliatreau provides contextual information on the higher education and research system in France and further analyses the impact of the PIA.

Jiani Zhu provides an in-depth analysis on the Excellence Initiative in Germany in her chapter. With its long history, the German, or Humboldtian, model of universities influenced higher education development around the world by the end of the 19th century. However, similar to the situation in France, the performance of German universities has been less impressive in recent years, compared with other developed countries. An "Excellence Initiative" was launched by the federal and state governments in June 2005 to strengthen cutting-edge research, to support and promote elite institutions, and ultimately to improve their international

competitiveness. This programme breaks its egalitarian system by only focusing support on universities with the strongest international research potential. The Excellence Initiative has been implemented in two phases (Phase I: 2005/2012; and Phase II: 2012-2017). Zhu argues that this ground-breaking Excellence Initiative has changed the higher education landscape in Germany by boosting research power, enhancing its international reputation, increasingly attracting talented scholars from abroad, and by creating a culture of competition across German universities. However, this research-oriented funding scheme is mainly criticized for its unequal distribution in terms of geographical locations and for its negligence of teaching. Thus, further implementation of this programme requires discussion on how to sustain strong financial support and how to maximize its positive effect in the long term.

Isak Froumin and Alexander Povalko's chapter reviews three projects adopted to promote academic excellence in Russia. Again, aware of the relatively poor performance of its universities in higher education globally, the Russian government has initiated a series reforms in its well-differentiated higher education system since the 1990s. One of the core challenges to develop research universities is the past separation of research and the university education, a feature of the Soviet system. To strengthen its research capacity and to ultimately improve the competitiveness of Russian universities internationally, the government has consistently invested in the higher education sector through various funding programmes: the particular support for the two leading "national treasure" universities, Moscow State and Saint Petersburg State University, the establishment of several "federal universities," and support for the National Research University programme, along with a number of Targeted Federal programmes. As a critical analysis on these programmes shows, in spite of research quality enhancement, serious examinations and discussions on the lack of the effectiveness of these funding initiatives are needed. The authors argue that important issues for further policy actions for excellence include the setting of reasonable goals and approaches to achieve them, providing flexible financing, improving openness and transparency in institutional development, emphasizing national partnership, governance reform, and sustainable funding.

Geo-Suk Suh and Sang-June Park review the ongoing journey to develop world-class universities in South Korea. The Korean government identified several weaknesses in its higher education system in response to the demands of the global knowledge economy. Compared with other developed countries and with international standards, higher education institutions in Korea seemed to have a lower level of academic competence. To enhance the nation's global competitiveness, the government initiated the Brain Korea 21 (BK21) and World-Class University Projects higher education reform projects. Both projects bring have been fruitful, including increasing qualified human capital, developing graduate schools, promoting partnerships and collaboration between education, research and university-industry, and improving the internationalization activities of Korean universities. To consolidate the previous two projects' successes and responding to their issues and challenges, the Korean government has implemented

the BK21 PLUS project (2013-2019) to train talent, strengthen research competitiveness, reinforce industry-education co-operation, as well as enhance education quality, in particular. The authors point to two factors to achieve progress and success: the provision of sustainable financial support and the assurance of regional balance.

Following the Korean example, Akiyoshi Yonezawa and Angela Yung Chi Hou put the cases of Japan and Taiwan together to analyse the common challenges they face. Taiwan and Japan share common features – well-developed economies, ageing societies and the threat of losing high quality human resources, declining public funding, and an imbalance between the quality and quantity of education. With increasing international competition, both realize that to develop highly skilled human resources and advanced science and technology is a policy priority. They have therefore adopted "selection and concentration" policies, such as the "Centres of Excellence" and "World Premier Initiatives" in Japan, and "Development Plan for World-Class Universities and Research Centres of Excellence" and "Teaching Excellence Initiative" in Taiwan. These endeavours have elevated their leading universities to world-class status. Echoing the previous chapters, both authors argue that, as excellence building is a long-term struggle, one crucial question is how to ensure adequate and sustainable funding support to higher education, which is essential to maintaining national competitiveness in a global knowledge economy.

Qi Wang and Ying Cheng's chapter discusses the policies and practices in developing world-class universities in mainland China, particularly the 985 Project – a centralized, outcome-oriented funding programme. The authors claim that the 985 Project and its financial support have a great impact on the development of the selected universities in terms of research and education quality, and knowledge innovation. These selected universities' elite status in the Chinese higher education system has been strengthened. However, a gap still remains between universities in mainland China and other world-class universities in the world in terms of research quality; and the research and academic culture has not fundamentally changed. It is argued that, as the funding allocation is organized and decided by the government with little transparency in the selection and evaluation process, strategies need to be, and have been, adopted to stimulate and inspire a competitive mechanism in the third phase of the 985 Project.

Opportunities and Challenges of Developing Excellence

The second section of this volume comprises of the context of global pursuit of world-class universities, both in developed and developing countries and regions. It intends to provide critical discussion on the role of world-class universities in promoting national and regional economic growth and social development. It focuses on the key issues and challenges facing governments around the world, including decreasing public funding, tensions between building excellence and developing diversity, balancing global competition and local development, and the relationship between research funding investment and productivity.

Related to funding and resources, William Tierney begins the discussion by raising the question how leading public research universities in the US can maintain their excellence in the post-financial crisis context. Tierney argues, based on the current definition of and discussion on world-class universities, that public research universities are going to face two-fold challenges, particularly related to the neither efficient nor effective public regulatory system. First, significantly declining funding may prevent public universities from developing and competing against their private counterparts, despite institutions increasingly diversifying their financial resources. Second, as disruptive technology and social media are transforming higher education and the way universities used to operate (such as by online learning), whether public universities can respond to these changes in time remains questionable. Any institution that is "immune" to changes will confront significant problems. Tierney also points out that disruptive technology may impact or even alter the current criteria for excellence.

One challenge to building world-class universities is how to develop a differentiated world-class system and counterbalance the trends towards isomorphism. The diversification of higher education system takes place in various forms of collaboration, including alliances, coalitions and mergers. Marijk van der Wende discusses how these activities may affect the missions of universities and to what extent it is possible to measure the diversity of the higher education system. Reviewing different forms of collaboration, this chapter analyses the related questions and dilemmas of mergers and university missions, including the tension between institutional size and missions for teaching and research, the balance between teaching and research, and the balance between government steering and institutional autonomy. To achieve a combination of excellence and diversity at system level, appropriate measures of system-level diversity and performance need to be developed.

To what extent a developing country needs to have world-class universities has been debated in the recent years. Andrés Bernasconi employs Chile as a case study to illustrate this question. As a middle-income but relatively small country, Chile has a relatively long history of higher education. Its universities, mainly teaching-oriented, are among the best in Latin America in terms of output, efficacy and efficiency, and have played a key role in the socio-economic development of the country. However, if using research-based indicators of global university rankings to evaluate them, Chilean universities still fall behind and do not fit the category of a "world-class" research university. The comparative analysis between the two leading universities in Chile and the State University of Campinas in Brazil shows that Chilean universities fall behind in terms of graduate enrolment, faculty recruitment (talent), financial support (resources) and competent university management (governance). Bernasconi argues that the quest for two or three world-class universities would be feasible in Chile, if additional financial support from diverse resources is provided, scientific research and the relevance of knowledge transfer to serve the demands of the local community are emphasized, and education at both undergraduate and graduate levels are expanded. In addition,

while institutional autonomy is important, interaction with government in terms of the strategic planning and steering of higher education development is necessary.

Echoing the Chilean case, Gerard Postiglione provides an insightful analysis on the University of Hong Kong to reflect how the university plays a key role in helping Hong Kong, a small-sized economy, to anchor globalization and ensure its long-term competitiveness as a major global city. The University utilizes its long history and its Western academic heritage to position itself as the leading international university of China, attracting top students and leading scholars from all over the world. As Postiglione argues, the University's success depends on a healthy environment of institutional arrangements, international brain circulation, as well as partnership and interaction between academia, industry and government. While its location enables it to enjoy open access to international knowledge networks, the University also plays an important role in China's development in the global economy. All these factors constitute the context within which the University develops its world-class status.

Comparing the data from 21 universities in Asia, Australia, Europe and North America, Kathryn Mohrman's ongoing research discusses the impact of national investment in universities in terms of research funding and publication performances, both quantity and quality. The findings show that universities in different nations have increased their investment in research at a higher rate than the overall growth in university budget. Many of the case universities have increased the number of publications indexed by the ISI Web of Knowledge, which in turn has improved their positions in global university rankings. However, using the Leiden impact factor in further analysis, it is not difficult to find increasing research expenditure may not necessarily be associated with research quality enhancement. Hence, increasing research expenditure alone is not the only answer to improve universities' competitiveness.

This book not only represents a contribution to ongoing discussions on the topic of building world-class universities, but also a continuation of the previous four volumes on this topic – "World-Class Universities and Ranking: Aiming beyond Status" (Sadlak & Liu, 2007), "The World-Class University as Part of a New Higher Education Paradigm: From Institutional Qualities to Systemic Excellence" (Sadlak & Liu, 2009), "Paths to a World-Class University" (Liu, Wang & Cheng, 2011), and "Building World-Class Universities: Different Approaches to a Shared Goal" (Wang, Cheng & Liu, 2012).

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SECTION 1

NATIONAL AND REGIONAL REFLECTIONS ON EXCELLENCE INITIATIVES

MICHEL ROCARD

2. A NEW PUSH IN FRENCH EXCELLENCE

Could France Again Be Capable of World-Class Research?

It is an honour for me to have been invited by your University. I feel it even more deeply as I am not a researcher or a PhD in sciences or an "academic" in anything of the sort. This is even somewhat of an irony, since I get to be asked by you to inform you of what is happening in France on the various fronts of higher education, research, knowledge, its creation, transmission and dissemination.

You had indeed noticed that, in this area, something is happening in France, which does look like a crisis.

Actually, you had to be puzzled at seeing, in your annual rankings of higher education and research institutions, that, as years go by, there are only very few French institutions among the top one hundred; less than a dozen in the second hundred, and only few again in the last three hundred in your list. Could the country of Descartes, Condorcet, Carnot, Lavoisier, Pasteur, along with so many others be walking out on knowledge?

What, for you, was a cause for astonishment was for us French the brutal and tragic realization of a disaster that only a few in the know suspected, and that has begun to show, in recent years, in serious manner: abnormally high failure rates of students in graduate courses; steep deterioration of our external balance of patents and licences; the collapse of our language in the world's intellectual flowering; etc.

Yet, you heard things were changing, and with a vengeance, too. You also heard I was involved in this change. That is precisely why you have invited me.

To do this, I need to remind you of some context. A few minutes will be lost, but it is certainly worth the time.

First, on the face of this planet, Europe is an oddity. Around the world and throughout history, when peoples became sedentary, they sought security. Leaders were eager to ensure it while receiving their legitimacy for succeeding.

Everywhere the narrative is the same: our people are good, warm, brotherly, therefore good policing will suffice to deal with the few offenders. The real threat of violence comes from the OTHER, who does not have the same skin colour, speaks differently and prays to other gods.

We must push our boundaries as far as possible and send our armies there to defend them. Empires extended to the limits of the so far explored world and travelled as they could afford in those days. This is obviously the case of China of course, with the Great Wall to prove it; it is also true of India, and of the Japanese, who travelled across all its islands. This can also be said of the Aztec empire to the

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south of North America and of the Inca Empire, northwest of South America. It is equally clear of Upper Egypt, Cyrus in Persia, Alexander of Macedon; the Roman Empire as well as the Russian empire in Siberia are both cases in point. This can be applied as well to the Zulu and Benin or Mali empires, although Africa's history is not yet written.

Europe stands as an exception to this pattern. Fifteen distinct linguistic communities proved populated enough to resist each other and prevent the birth, or rather rebirth after the Roman one, of a single empire of such dimensions. One exception was Charlemagne's in the 9th century, but his empire broke up in less than a hundred years. Since then, we have been slaughtering each other, because borders are unstable, and we keep dreaming of unity without ever achieving it. Even the current European Union is a political paralytic.

Within this European oddity, France is another oddity. We are the only country that does not result from a single language community. When, in 1914, we had to mobilize our people to go to war against the Germans, to our dismay 80 percent of young mobilized conscripts did not speak French but Breton, Occitan, Alsatian, amongst other dialects. France is a military creation, the result of a continuity of royal dynasties from the *Val de Loire*, the Loire Valley. To achieve this, our forty successive kings did all they could to erase – kill, actually – five cultures, a word defined as the coincidence of a language and a religion: Brittany; the Occitan, Alsatian, Corsican and Basque Countries, as well as Flanders, can partly be described as such. The republics that followed forcibly imposed the monopoly of our current language.

I believe I need not carry on about the details of the context: you have already figured it all out. A nation that has been willed top-down and battered together by its army can last out only by relying on the extreme centralization of its administration. Everything is decided on in Paris, even local public facilities. Any local or regional autonomy is suspected – legitimately so for too long – of irredentist or centrifugal tendencies. Local authorities have to endure the tightest supervision by the most centralized government in the entire Western world.

Furthermore, knowledge has been proved dangerous. Such a brutal, push and shove history is food for intellectual excitement. A great many French people have reflected, written, invented, discovered and produced music and paintings over the last millennium, and this was often deemed subversive. The Enlightenment was the mother of the Revolution. Napoleon assumed control of the State over secondary education and dissolved universities. Only faculties managed to rise from the ashes. Today, after being painstakingly rebuilt over a century, our universities remain weak, faltering and dependent on the State, which keeps a watchful eye on it all.

Finally, but it is of great importance for today's topic, our people got rid of archaic situations and privileges of yore, more brutally and more comprehensively than any other in Europe. The great Revolution provided the chance of achieving our national crystallization. The people became sovereign, and out of caution gained from history, vested sovereignty at the very top, in Parliament, while prohibiting delegation of it to any other, especially not local authorities, counties or

cities, and even less to academic institutions. Therefore, creating a university is a state decision, and it will choose to do it only provided it is in charge.

Meanwhile, the people also expressed, against the return of abolished privileges, its commitment to equality. The word is even part of the Republic's motto. Regarding our subject, exhaustively, this has resulted for example in legitimizing any territory or "*département*" (county) to request from the state the establishment of a university, when none already exists. Thereby, we have 81 of them today, all too small obviously, and since they are at the government's service, they are endowed funds annually under the nation's budget, but without heritage or resources of their own. Hence, they are very poor indeed. This does not facilitate access to the capabilities of modern instruments of discovery and of knowledge creation.

The same requirement of equality has led to other consequences.

One of them is that the State has the moral obligation, not a statutory one for all that fortunately, to make sure, willy-nilly, that the subsidies it pays to universities, whether large or small, provincial or Parisian, amount to the same per student expense in all of them. The means to fight against the lack of research funding can therefore hardly be found in that direction.

Here is another consequence of this political and constitutional commitment to equality: the promotion of personnel cannot be left to departmental heads' discretion, based on assessment of their merits and their results. It is deemed impossible for the dialogue between the director and one of his subordinate researchers or teachers to take place without being tainted with personal affection. Such assessment can only be suspected of being subjective – therefore arbitrary.

This is of course unacceptable. Seniority is then the sole possible basis for evaluation on completely objective criteria. Trade-unions have always acted as vigilant guardians of this tenet, even more staunchly than about the former principle. As they are very powerful while governments are weak, they obtained many a minister's resignation. We can no longer get rid of the mediocre.

Now for another consequence of this tropism. Though French birth rates had weakened so much for a century as to transform France into an immigrant country (the only one in Europe), our nation heeded the powerful and lasting wake-up call during and after World War II. This has been called the baby boom. It was deemed an obvious fact – not worth stepping back and thinking about it – for France to accept turning its secondary education into a mass endeavour; its numbers increased tenfold in less than twenty years, without being able to apportion the necessary funds.

Same thing, or just about, in higher education. Upon entering college, it was deemed wise, and was actually done in France, a long time ago and to a small extent mind you, to organize the careful selection of incoming students – and you, who are listening to me here, have all always been doing it in your countries. Selection, you said?! When all the country's youths go to primary and then up to high school? You can't be serious! This would be in violation of all republican principles, the establishment of institutional inequality, confirmation that the high and middle classes do not identify with the people. Can't be done … By mutual

agreement between the right and the left and under two republics in a row, the university has been barred from conducting any serious selection at entry and forced to accommodate all the youths leaving secondary education. We went from 100,000 to two million students. Naturally the corresponding financial means have not been forthcoming. Among other results, here is one: 50 percent of students fail at the end of the first year, and vanish without a degree from university onto the labour market; this has been happening ever since and is still almost always the case. Another result: the overall financial poverty that results from all this leads to having to make do and barely squeak by, to the discomfort and decay so typical of the teaching proper, but certainly precludes even more definitely any significant effort in favour of research because, though research is necessary to maintain a vibrant intellectual life and foster progress, it can be dispensed with when it comes to coping with the daily functioning of schooling.

I was told you wish to understand it all. If that is the case, bear with me, I still need to provide one more fact and two comments.

That fact, actually, you have always known it, but I need to mention it again and account for it. Faced with such a multi-secular university disaster, economic forces, scientific or literary elites, and even – perhaps especially – the State, have sought ways to limit the damage and secure the elite's training and transmission of higher learning. To achieve this, from the last kings to the Revolution, the Emperor, the Republics, and private industry as well, all have conspired to establish our so unique *Écoles supérieures* (Higher Institutes, if you will), with tightly restricted access and highly talented. More than twenty of them claim the title of *Grande École*. Many are public, some private. All are highly selective, small, with highly qualified staff. Yet, their size and purpose greatly limit their access to research. Henceforth, to keep up top-quality research, the State had to create and expand large specialist institutions. There are some for medicine, for the sea, for agriculture, for the atom, for a little of everything. Money has been pouring there. All are powerful, efficient, talented, skilled, and basically quite isolated. All are highly autonomous, all of them cut off from the University. They dread having to depend on a university or even on the minister of education. They have hardly got used to establishing collaborations with each other and are basically reluctant to work together. Nevertheless, they are for a great part to be credited for what remains of successful research in France.

This is the context.

And here is my first concluding remark.

Let me say a few words to greet the talent, dedication and enduring courage of all those teachers, researchers, principals, directors, deans and rectors who have managed to keep such a system afloat throughout the previous century.

Second concluding remark: it is rather an anecdote that should make you smile: in the middle of it, all governments, it was the least they could do, have sometimes sought to reform the system. The last but one government even had lofty ambitions: granting universities their autonomy would certainly enable them to grow, he thought. Well, the French breed of higher education professors must, among all languages, religious practices, skin colours, levels of knowledge and

income combined, be the only one in the world able to go on strike to fight against their own empowerment and autonomy!

The State is the only guarantee … but, try as it might, this is not what it is primarily meant for and so it makes a mess of it. This is a disaster. My beautiful country makes you wonder sometimes, it is all so distressing.

A surprising change came from politicians. Political power everywhere is in charge of managing what exists. Except when revolutions break out, it is most of the time and just about everywhere unable to bring any change at all, in France more than anywhere else. Yet, the severity of the collapse had become more blatant, not only in the Academic Ranking of World Universities (also called the Shanghai rankings). It became a political concern.

Then a series of decisions were made, all as astonishing as unexpected.

In 2007 France elected an atypical President, and then granted him a parliamentary majority. Nicolas Sarkozy is determinedly and brazenly conservative. On some issues, he even feels barely hidden sympathies for the extreme right, which is a foil for the Socialist parliamentary opposition, and also a concern for a small part on his own side. He is an activist, a brave one; he makes fast and hard decisions and is at times proven right, at others wrong. The majority-opposition relationships in Parliament were tense and appalling. There was little ground for cooperation.

This President has hardly any or no economic culture. It was a blessing actually: thanks to this he has no taboos, as shall be seen. He was well-aware, he said it himself, of the collapse of higher education and research. But he had to admit he could do nothing about it. Structures are rigid and there is no money anyway.

Since 1974, the last budget in surplus, France has posted back to back deficits and increased debt. The 2006-2008 financial crisis suddenly made matters worse and the debt is staggering today.

For almost fifteen years, we have experienced nearly zero growth, massive unemployment and the dangerous global financial mess. In this context, the central body of a very mixed party – called the UMP, then at the helm in France – rallied to monetarist visions, in the wake of the United States, Britain, Japan, the Netherlands, today's Germany for a great part, and the IMF; but this body is more intelligent and circumspect than the rest, and is of all evidence eventually switching to a different doctrine.

Still, according to that doctrine, the state can do nothing about growth and does not have to get involved. Growth can only be achieved via private investment, which itself depends on trust. Get your budgets balanced, keep your word, pay your debts, be serious: confidence will return and growth along with it.

The debt must drop, it can't increase, no two ways about it. This, in economic matters, is the unifying intellectual corpus of the French right.

President Sarkozy agrees with this narrative (though no zealot about it) and was alarmed at the growing scientific and technical French collapse. He saw it as a threat. One day in 2009 he said he would float a comprehensive "National Loan for the Future" with a view to resolving this disturbing situation. This announcement triggered general amazement, concern among many in the administrative,

intellectual and political circles, well beyond the UMP. Even within the UMP, anger flared. "We are already too indebted, this is very dangerous. The IMF, Brussels and Germany are bound to rant against it. We'll lose our French triple-A credit ratings." The majority split over it, hostility hardened. Parliamentary success became uncertain. Sensing it, the President sought broader political support for the operation.

By promoting research and higher education, the project plays in favour of personnel, a great number of who vote on the left. They might as well support the President's project, or at least not oppose it. But it had to achieve great visibility.

The President of course put in charge of the operation one of the most respected and talented men in his camp, former Prime Minister Alain Juppe. But he decided – and this was his second oddest idea after the strangeness of the loan concept – to also call upon a leftist as co-director of the operation. I am a former Prime Minister, fairly respected and not really busy at the time. He called me.

Without consulting or asking permission from anyone, I agreed immediately. Strangely enough, though they could well have – because working, even internally, under orders from the enemy is treason – Socialist Party members did not make any comments or remarks, much less a reprimand. Maybe out of some kind of respect, or perhaps to avoid image damaging public conflict, or then again and especially, because of the extreme importance of the subject matter … Here I was, free and without pressure or coercion.

The President of the Republic set up a 20-member strong commission, picked among the most respected scientists in France, in all subjects, including even some heads of institutions. The commission was formally installed by the President of the Republic himself in his Residence. Alain Juppe and I were appointed co-chairs. The ceremony ended, as did time for solemnities and the room was slowly clearing.

Alain Juppe and I stayed alone; we were sitting at a corner table in the empty room. What next?

A few intermittent parliamentary jousting over twenty years is not enough to tie bonds of friendship or trust. We hardly knew each other. Neither of us could help smiling about the situation.

All he knew about me was that I am a staunch socialist, but a moderate, heterodox one, and reconciled with the market economy. All I knew about him was that, though he is right-wing, he is not one of the financial right. He even scorns it somewhat and sometimes quite overtly so. In fact, and basically, he is a Gaullist – meaning that the State, its importance, efficiency and respectability lie at the heart of his political vision. No absolute antagonism stood between us. Nor was there any technical preparation for this unscheduled meeting. It had to happen, but later, in a more solemn and better prepared atmosphere. But then, here we were … almost by accident, and no collaborators to hold our hands.

Two veteran political foxes, respected for their past, both boasting very diverse experiences, therefore powerful, both free from the heavy political apparatuses we both have belonged to for a lifetime, which we have even temporarily led, were left here to observe each other with complicity.

No hierarchy, either political or administrative, or corporatist was there to control us or clip our wings. Neither of us, besides, belongs to the relevant professional groups – teachers, researchers, experts, scientists or heads of institutions.

We had received one instruction: "Stir up and boost research and higher education in France. The loan will take care of the funding, just tell us how much you need and deliver, anyway you choose. I just want results."

No comments or instructions on possible limitations on the scope of our assignment, or about procedures and resources either. The sectorial ministers concerned will be kept informed – later.

Neither of us was inexperienced. In half an hour, just talking, keeping no written record of it, a pact was passed. I whipped into the list just three measures of equal importance and of the same mind, but actually taken later.

- We will steer clear of territorial planning. Reducing inequalities, regional though they actually are, is neither our business nor our goal.
- We won't help existing institutions as such (with subsidies, grants or loans), 81 universities, 20 *Grandes Écoles*, twenty research centres: this would only result in dusting and spraying.
- Our support will be awarded only to innovative projects and on condition that the necessary strengths are gathered behind to bolster it. That innovation was huge.
- We'll back excellence only, as well as anything that comes close to or is capable of it.
- To take our pick among projects of excellence, financial awards will be granted – by an international jury.
- We will not help the regional infrastructures. The timeless rivalry between rail and road, areas threatened with desertification and overcrowded ones is serious and ever present. But it is insoluble without getting ourselves deep into political conflicts, and consensus is what we need. And above all it does not foster innovation. Now, we want to promote innovation, first and foremost. That issue has nothing to do with it.
- As much as to fundamental research, if not more, we will give priority to the industrial translation of research findings. Therein lies France's major weakness. Unlike Germany, for example, SMEs in France are almost excluded from access to innovation, because they have no network ties with researchers and their institutions.
- We will reintroduce nuclear power, one of France's best assets, which is unfortunately weakened by environmentalists' electoral and political terrorism. But the emergence of 4th generation fast-neutron reactors is a pressing economic emergency.

  They are yet to be developed, though.
- We will behave responsibly with Public Finance. The private Office of the President of the Republic – never himself, mind you – had come up with incentives to increase the loan to €100b. Such levels of debt were plain madness: this would be the recipe for immediate downgrading by two degrees

of France's credit ratings; it would cause a dangerous rise in interest rates on our own debt and would contribute to the likelihood of default by France, by the end of the decade. In addition, applications are far fewer than one would expect. Hopes have been clipped and many applications have not even been sent in. Though dreams and frustrations about them are rampant, well-designed projects, validated, assessed and just waiting for funding, are not so numerous – even after the wake-up call message sent by the floating of a "national loan." We will restrict ourselves to an increase close to 10 percent of the outstanding debt. For the markets, it is, as they say, "the thickness of the stroke," hence little detectable. For the French University and Research departments, it amounts to €35b, no less, over a few years, a huge sum that sector has never enjoyed for decades. Though sizeable, the loan is macro-economically modest, and it was a mistake for the press to dub it the "Great Loan," largely to its detriment, besides. The financial markets, for their part, will not even blink at such sudden yet moderate increase of the French debt.

– Finally, to further limit expenditures, and thereby gain more than one percent interest rate, we will not ask for the loan to be specifically identified when it is issued to the general public. It will be buried within the Treasury's overall issues, negotiated between banks. It will leave no registered trail in French financial history.

Our committee, all in all, was pretty amazing. It represented many sectors and institutions where the need for massive additional funding was urgent.

Everyone was perfectly civil; nobody questioned the limitation of the total amount.

Nor did anybody challenge the fact that requiring such a level of excellence, combined with the consolidation of specialized teams, might seriously call into question the very autonomy and sustainability of many institutions as such. Some existing entities would have to be split. This in itself was quite of miracle, probably owing to everyone's painful awareness of our general state of decay.

Over several months, our commission launched a systematic investigation of pending cases, as well as of outstanding or maturing ones in French research, namely:

– Fruitful ideas yet stalled due to lack of resources to pursue them.
– Projects completed intellectually but not having even led to prototyping, out of lack of resources.
– Projects carried through, including prototyping, but not yet at industrial level, etc.

This was Alibaba's cave. We unearthed many unexpected nuggets, frequently at the forefront of global knowledge. Though it is industrially weak, France is still a smart country.

Unanimously, our commission decided to allocate this new resource, according to seven axes.

1st axis: Almost half of the total, €16.5b, was to go towards higher education, research and innovation.

This priority axis was the most revolutionary action for the future: triggering the emergence of a small number of global-sized and reputation institutions, by consolidating existing entities. Some old establishments might have to be scrapped. When will *Polytechnique* (one of the highest-ranking *Grande École* for sciences) students get rid of their military uniform? Whatever. And would you believe it? It washed so well with the committee that represented it that it put up with it without even flinching.

2nd axis: Encourage the development of innovative SMEs: €2b.

3rd axis: Speed up the development of life sciences. €2b.

4th axis: Develop low-carbon energy and energy efficiency in the management of resources, €3.5b.

5th axis: Designing Tomorrow's City: €4.5b.

6th axis: Invent the future of mobility (air, land, sea and space): €3b.

7th axis: Invest in the digital society: €4b.

This was a stupendous device, an intimidating one besides, as it was completely innovative. No existing French administrative, financial or scientific institution, whether public or private, was able to support it on its own. We had to invent everything, including structures and procedures. The government at the time was able to create a new flexible, lightweight structure from scratch, attached to the Prime Minister, pompously called the French "General Commissariat for Investment" (GCI), not even an agency actually, or a "mission" and, to head it, appointed a prominent personality.

René Ricol is a financier, chartered accountant and consultant combined. He comes from the private sector; he hates the hassle of cumbersome government. He is immensely resourceful, adamantly tenacious, and his great sense of leadership is combined with a warm and friendly personality.

The magnitude of the adventure, a crucial stake for the country, the total freedom enjoyed by all had already stirred up the Committee's enthusiasm, and then enabled the Commissioner to gather around him the best French talent from the administration, research, industry and finance.

This stunning General Commissariat for Investment was to carry out an incredible performance:

- Invent new procedures, labels of excellence for example and campuses of excellence, too.
- Invent wherever necessary new structures or institutions: laboratories of excellence (joined clusters under certain conditions), boarding schools of excellence and especially technology transfer companies.
- Make one of our Committee's most unexpected suggestions in France feasible and acceptable, besides managing it through to completion: support to Universities will no longer be in the form of grants but of capital endowments, not to be consumed but producing interests. This is the beginning of funding in the American or German ways. Harvard is allegedly sitting on, say, US$30b assets. French universities: zero. We will have to start small, it will take half a century to grow. But we do have half a century: this is work for the long haul,

all the more so as, thereby, Universities conquer the right to increase capital of their own: thanks to donations, bequests, research contracts, patents sales, etc.

– Find funding from existing structures, whether from public or private banks, local government or research funding institutions, specific additional funding for well-defined projects, but that will give the whole operation a three- to four-fold leverage, which is huge.
– Select large public instruments to bolster or operate each action: The *Caisse des Dépots et Consignations* (the French equivalent to the Official Receiver), an SMEs Bank (known as OSEO), the Agency for Energy Management, the Research Agency, etc. Organize together with them the selection (by international juries' awards in most cases) of project workers, organize and monitor the precise contract between operator and contractor.
– Negotiate and, since it can't be dispensed with for many operations, get approval from European Community authorities in Brussels.

Oh, and I almost forgot the most important of all. Administratively speaking, the Commissariat has no authority. It suggests and puts forward proposals. The Prime Minister is the decision-maker regarding everything, and he does it faithfully, with no hesitation or reservation. Parliament is abundantly informed, and the whole scheme is confirmed in Finance Acts.

This state of facts and rule resulted in the Prime Minister bringing some marginal changes in amounts or procedures. The campuses of excellence became IDEX (institutes). A little less funding went to Tomorrow's City, a little more to life sciences. The spirit and the dynamics never changed.

Then we had an earthquake. France is a pluralist democracy, unstable and capable of drastic changes. The presidential elections were held. In 2012, there was so much resentment and conflict that power changed hands. My side, the Socialists, took over.

None of what I have just explained to you is public knowledge yet, even though a few elected representatives, some university officials and a few business leaders are engaged in the process. In the eyes of Socialists, a Sarkozy signed project is automatically disqualified. In addition, France strives at decentralizing. For the past thirty years, twenty-one regions in metropolitan France out of the 22 there are in all are run by a Socialist majority. The Regions Presidents Committee is a rising and powerful force. It felt greatly tempting to say, "Hang on! Surely, all that money has got to be allotted back to the regions." It is an essential support of the new government.

Alain Juppé and myself, having acted as co-chairs of the initial Committee, became heads of the inevitably ensuing monitoring committee, comprising in particular strong parliamentary representation, and were therefore in charge of presenting the case to the new government. Prime Minister Jean-Marc Ayrault is a friend of mine, of very long standing. He discovered the project, analyzed it, found it was worthwhile, hence approved it and decided in favour of keeping it up. He also was assigned to select who would replace the Commissioner General, René Ricol, and appointed probably the best possible successor, Louis Gallois, one of the creators and long-standing boss of Airbus, one of the great successes of

Franco-German cooperation. Gallois, an admirer of the process approved of it, made sure it was continued and even intensified it.

The new policymakers in office not only respected and adopted the scheme: they extended and intensified it.

A general law on research, meeting other objectives than the national loan, was drafted so as to ensure full compatibility.

An additional tranche, an extra third namely €12b, was committed – a considerable amount. This is when the environmental and energy transition, in particular, made a place for itself, with €2.3b. The Defense industry, a powerful and very innovative sector, left behind in the first phase, and threatened by the deep fiscal crisis faced by France, obtained its preservation to the tune of €1.5b. And above all, the University was allocated an extra €3b, which essentially were kept in the form of non-expendable endowments, and will, a cautionary economic measure, be payable only as of 2015. The Socialist government had just confirmed and strengthened the most profound change and the most ideologically controversial one proposed by our Committee.

The process stirred general enthusiasm and rallied energies. Time passed. The first results are beginning to show.

Among the system's intellectual inventions, there is a new institutional, hitherto unknown concept, the "Institute for Technological Research." In France, before this came about, anyone speaking of University research used to automatically imply "fundamental" research. Universities have incorporated these IRTs. Several have already been launched:

- One in Grenoble for nanotechnologies. It had already been germinating in the unusually intense cooperation between universities and companies in that region.
- Another in Toulouse for aeronautics. Actually, it was already running, informally. But its IRT status attaches numerous medium-sized enterprises, left behind so far.
- The most surprising perhaps, because born not so much out of a compelling local story as of suddenly contagious enthusiasm: the Jules Verne Institute in Nantes for materials and composites.

New institutions are blooming throughout the country and across all domains. I can't go on forever. I'll just conclude with one last example, but not the least: it is the most massive and most significant one, because the most confrontational at first.

South West of Paris, near a plateau close to the city of Saclay, lay several hundred square kilometres of still largely farm land. A lot of space, and close to Paris into the bargain. For thirty years, separately, institutions wanting more space have been setting up their offices there, spread and got their students to move and live in a natural environment. A few *Grandes Ecoles*, three universities, the nearby Versailles one and two from Paris, have set up two branches there, and major research institutes: for atomic energy and agriculture.

Twenty two entities have been built side by side there, though they do not work much in synergy with each other, among them are the *Ecole Polytechnique* and the Commissariat for Atomic Energy.

Then came the process of the national loan for the future. 22 entities got together and put forward a few highly ambitious projects.

The international jury rejected the application. Mayhem broke loose! The argument was "there is no governance at the helm of your projects, you only want to share your money just the way you used to do, to fund projects of insufficient scale; this was not the idea to begin with." This triggered a crisis. Some unit presidents resigned. A younger generation took power. The merger was agreed on; and the jury validated it.

In November 2014, the Paris Saclay University is to be launched under a single integrated authority – resulting in 18 percent of French forces in hard sciences working there. This is twice the size of Berkeley's. 22 entities are to merge into it.

Finally, hundreds of companies, large and medium ones, are already associated with that innovation process.

The rest of the story remains to be written. You will naturally be the first to know. Especially in conclusion, I would very much like to thank you all, the global knowledge community, because many among you have participated on a voluntarily basis, or just about, to these international juries who warranted the process effectiveness and legitimacy.

This is only the beginning. The renewal of the operation is currently under consideration.

Thank you for your attention.

Michel Rocard
Former Prime Minister (1988-1991), France

GHISLAINE FILLIATREAU

3. CONTEXT AND FIRST OBSERVATIONS ON THE "INVESTMENT PROGRAMME FOR THE FUTURE" IN FRANCE[1]

INTRODUCTION

In 2009, at the height of the economic crisis, and after implementing in 2008 a large €35 billion stimulus plan to rescue the banking and corporate sectors, the French government decided to launch a vast structural support program, the "Investment Programme for the Future" (PIA, programme d'investissement d'avenir), to accelerate the country's adaptation to a rapidly changing international context, and prepare the French economy to rebound quickly when the crisis ends. In 2009, a mission was entrusted to two former prime ministers, Messrs Alain Juppé and Michel Rocard, to build up a large "investment programme for the future." The two former ministers advocated a series of devices that largely focused on higher education and research: the point was, in particular, not to let the crisis hinder developments that have been underway for several years in this sector, a key sector for the future. The programme, launched in 2010, is described by Michel Rocard in the previous chapter.

Today, in early 2014, it is too soon to see the impact of a programme of such magnitude, with its long-term ambitions. Regarding universities, it might also prove difficult to distinguish the PIA's specific effects on the many actions and reforms since 2005, which are all part of the same "modernization" orientation, in order to push them as one of the main tools for an innovative and performing economy, well positioned in the global competition.

As for the programme itself, it may be noted that the original methods used for its design, implementation, and monitoring, are quite original compared to the stakeholders' usual way of operating: as Michel Rocard explains, the PIA is also an administrative experimentation, in view of its boldness and creativity. This chapter intends to provide background information on the higher education and research system in France, in order to contextualize Michel Rocard's previous chapter.

FRENCH HIGHER EDUCATION AND RESEARCH SYSTEM

The French higher education and research system is built around three categories of public stakeholders: national research organizations (PRO, Public Research

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 25–30.

Organizations), universities, and finally schools for training the country's top executives.

Historically, organizations and schools have been created by the State, as and when new needs were emerging, while in other countries, this was taken up by universities. Thus, "elite schools" proliferated in the 18th century to develop the "mechanical arts," and organizations were founded all through the 20th century to develop research geared towards responding rapidly to the country's socio-economic needs. At the same time, universities were called upon to deal with high scalability in educational needs, related to raising living standards and the influx of young people born during the "baby boom" after the Second World War.

These developments have occurred in parallel, without questioning the dual purpose of universities and grandes écoles on one hand, and universities as research organizations on the other. Nor was the model where universities were designed as institutions within a single public service, distributed all over the territory, accessible to all, and financed and controlled by the State questioned.

Thus, at the beginning of the 21st century and with about 65 million inhabitants, the country boasts 162 higher education institutions, including 82 universities – each of them mostly dedicated to teaching only a few disciplines – three national Instituts Polytechniques (highly selective top schools in science); four selective schools (Ecoles Normales Supérieures) écoles for high-level teacher training; nine political studies institutes; many technical colleges of the British "polytechnic" type (some are private); schools of Engineering; and several specific establishments, such as the Collège de France, the National Museum of Natural History, the School for Advanced Studies in Social Sciences, the Ecole des Chartes, the Conservatoire National des Arts et Métiers, the Ecole Pratique des Hautes Etudes, etc. The largest public research organizations are the National Centre for Scientific Research (CNRS, Centre National pour la Recherche Scientifique), the National Institute for Agronomic Research (INRA, Institut National pour la Recherche Agronomique), the National Institute for Computer Science and Automation (INRIA, Institut National de Recherche en Informatique et Automatique), the National Institute for Health and Medical Research (INSERM, Institut national de la santé et de la recherche médicale), and the Atomic and Alternative Energies Commission (CEA, Commissariat à l'Énergie Atomique et aux Energies Alternatives). Most of their labs are shared with universities but their Fellows are paid by the PRO, and have no teaching obligations. Virtually all these institutions are state-owned and steered.

REFORMS IN HIGHER EDUCATION

From the late 90s, it was increasingly observed that the status of the universities is one of the weak spots of the system. This analysis is based on decisions taken at European level (the Bologna process; the generalized movement towards increased university autonomy and the creation of a European area for higher education), but also nagging concerns about France's international ranking in the world; among them, the results of the Academic Ranking of World Universities (ARWU) by

Shanghai Jiao Tong University did not fail to lessen these concerns, but gave them sharper resonance.

Accordingly, a series of reforms aimed at changing, first and foremost, the status of universities and their functions was launched in 2004, aiming to encourage them to establish links with the private sector, increase their regional integration and actively participate in European research and higher education, but also to stand out by more actively directing the contents of their syllabuses and the international visibility of their research towards achieving strategic strengths. It is also a matter of encouraging them to bring together the various institutions onto the same site, in order to build groups – Research and Higher Education Clusters (PRES, Pôle de Recherche et d'Enseignement Supérieur) – with a view to reshaping the whole system. The successful PRES is supposed to induce the local pooling of public capacities, to build the needed bridges with the private sector, and to become the coordinator of policies at national and regional levels. The purpose of it all was to build up a few powerful engines, efficient and dynamic enough to pursue new policies and gain international stature.

In 2007, the "Freedom and Responsibilities of Universities Act" was a noticeable point in this series of changes, by reforming governance, control and management of institutions. In doing so, the law increased the perimeter of action of universities, and most particularly gave them more control over their human resources (previously managed by the State), but also increasing the economic burden on these institutions.

In 2008, a plan was implemented to support the renovation of institutions: the "Plan Campus" programme materialized the definite intention to focus funding on a limited number of institutions, in order to foster the emergence of "campuses of excellence, enhancing the attractiveness and influence of French universities." This initiative therefore embodies a new principle: selective support on quality criteria, which openly encourages institutions to try to stand out.

The Juppé-Rocard report was completed in November 2009. It particularly stressed borrowing on the markets, if necessary, to launch a major programme to support the transformation of the French economy, including strong action in favour of the higher education and research system, to adapt quickly and decisively to international competition, thereby turning it into an effective actor in a new innovation eco-system. The "Investment Programme for the Future" (PIA) was set up. It is a series of funding initiatives meant to enable the most active players in each category to "build a new future."

Despite the financial crisis, €35b has been released, thanks to a State Loan (hence the name – "The Big Loan" – given to the project). Assuming a €25b leverage would be provided by the private sector, the designers hope that the actual overall volume of financing may reach a total of €60b.[2]

Over 60 percent of appropriations are to go to higher education and research, in particular selective projects, including: the "Initiative of Excellence" programme (IDEX), intended to give rise to world class university clusters.[3] The "Initiative of Excellence" programme is the flagship of the PIA, whose success or failure "is bound to carry great weight in the outcome of all higher education and research

operations." It is completed by the "*Laboratory of Excellence*" programme (Laboratoires d'Excellence), where selected laboratories are funded to sustain the rapid development of high potential research teams, locally based or organized as national networks. The "Initiatives for Excellence in Innovative Formations" programme (Initiatives d'Excellence en Formations Innovantes) is aimed at funding projects of excellence in education, training and remediation for students. Another generic programme for the development of a new academic landscape is the "Equipment of Excellence" (Equipements d'Ecellence), designed to build high quality infrastructures.

Moreover, the implementation of the PIA project is in itself innovative.[4] Calls for project proposals are organized on an open basis, to generate scientific synergies starting at the laboratory level. The projects are then selected by international scientific panels. The steering of the programme has been entrusted to an ad hoc inter-ministerial structure under the Prime Minister's direct authority, the General Commission for Investment (CGI). Funds are managed in an "extra-budgetary" framework, with specific and simplified circuits, relying on pre-existing structures that boast project funding experience (ANR, Agence Nationale de la Recherche and OSEO, now called Bpifrance). To preserve the originality of this scheme, a monitoring committee was introduced, under Messrs Alain Juppé and Michel Rocard's joint chairmanship.

REFLECTION ON AND INITIAL IMPACT OF PIA

Though it is difficult today to assess the specific effects of PIA, which are still ongoing,[5] all observers agree that it has been an opportunity for teams and institutions to show their ability to mobilize around high quality scientific projects – a fact underscored by all the international panels that scrutinized them.

These observations also indicate that the PIA, which has consistently bypassed existing institutional boundaries, has strongly contributed to boosting connections between various institutions within the same territory. Thus, in 2012, 26 clusters (PRES and merged universities) were formed.[6] One can observe that these local alliances fostered the scientific projects submitted in the PIA programmes since, out of the 8 projects selected by the IDEX jury from 18 proposals, 7 were steered by these clusters. Moreover, several of them said they would consider merging into a single university. Another point is that a few types of combined research and technology structures have been created, such as the "Institutes of Technological Research."

Also noticeable are the schemes actually deployed by the successful PIA institutions. Indeed, all have established funding actions to attract and retain top researchers: Institutes for Advanced Study have been created, as well as temporary senior or junior positions including extra-funds; "red carpet" procedures have facilitated the hiring of personalities, and calls for international applications – besides support for young talent, etc. – are just a few of the tools that have been brought to bear. Similarly, all have implemented internal calls for projects meant to

trigger synergies between laboratories and foster cooperation with the private sector.

Therefore, even if the institutional complexity of the system is still much the same, the PIA has clearly demonstrated how academic institutions are able to trigger institutional and territorial dynamics around major scientific areas, strengthen their presence at the local level, and approach the private sector. Such impetus has created opportunities for connections between universities, grandes écoles and research organizations, while turning the university into a partner of all stakeholders, at both local and regional levels. The PIA has emphasized its ambition for excellence and thereby reminded all stakeholders that the competition they have to confront is international and a very demanding one as well; and that the role of France in this competition is bound to be achieved through unifications and synergies, openness, and the pursuit of selected and fully accepted. It also recalled that, in most countries, universities play an active role and are the reference institutions in research, training and innovation, to help each territory perform to the best of its abilities.

The political push to create multidisciplinary universities in France – highly skilled in basic and applied research, capable of sustained collaborations with the private sector while able to control their strategies and means – has proved an important step in the "long march" initiated some twenty years ago. From this point, the next steps on are, firstly: to overcome a degree of fragmentation resulting from past circumstances; and secondly, accept a rational differentiation among institutions. In this context, the "investment programme for the future" has made a specific contribution: by openly providing at the same time a "quality" label and significant funding to selected projects, it has proved both innovative and a strong incentive. This also included the willingness of creating a few "French academic champions," able to face international competition of "elite universities" at the highest level; by deliberately positioning itself at a level of excellence, it has pushed up a new type of alliance between "Ivy league universities," "grandes écoles" and "national research organizations," fostering common projects and ambitions that might well bring forth tomorrow's universities. This, in any case, was the ambition it wanted to achieve.

ACKNOWLEDGEMENTS

The author would like to acknowledge Professor Thierry Coulhon and Dr Jean-Pierre Korolitski (Commissariat Général à l'Investissement) for their helpful comments and contributions, and Professor Dominique Macabiès (Université Pierre Mendès France, Grenoble, France) for translating this text into English, as well as Prime Minister Michel Rocard's intervention.

NOTES

[1] This article gives some context to Mr Rocard's previous chapter, to provide an introduction to French higher education and research system, as well as the PIA project.

[2] Of this, only a portion (€7b) may be used for immediate expenditure. The rest (€15b) is "non-expendable" i.e. only the interests paid on the endowment are to be spent by the selected institutions.

[3] Other important programmes aimed at fostering research activities were launched: biomedical research, green chemistry, innovation in transportation and urban technologies, ITT, boosting innovation in traditional industries, etc.

[4] The programme also intended to demonstrate that it is possible in France to be innovative regarding administration, as explained by Michel Rocard. This is reminiscent for French people of his father, Yves Rocard, a high level physicist, famous for its creativity, independence of mind … and criticism of the research administration.

[5] In 2013, the new majority government maintained the programme, somewhat reoriented, and announced that it will be supplemented with an extra €13b.

[6] Université de Bordeaux, PRES Bourgogne Franche-Comté – a.k.a. "ESTH-Innovation Université," Université européenne de Bretagne, Centre – Val de Loire Université, Clermont Université, Université de Grenoble, HESAM (Hautes Etudes-Sorbonne-Arts et Métiers), Université Lille Nord de France, PRES Limousin Poitou-Charentes, Université de Lorraine, Université de Lyon, Université Sud de France, Université Nantes Angers Le Mans, Université de Toulouse, ParisTech University, Sorbonne Paris Cité, Université Paris Est, Paris Sciences et Lettres – Quartier latin, Sorbonne Université, UniverSud Paris, Normandie Université, UPGO (Université Paris grand Ouest), UFECAP (Université fédérale européenne Champagne-Ardenne Picardie), Campus Condorcet, Collegium Île-de-France, PSL. Strasbourg was still in the merger, Marseille and Lorraine University merged thereafter, followed by Bordeaux. Eight highly ambitious Institutes of Technological Research have been selected. And there is an ongoing big project at the "plateau de Saclay," to create a very high level cluster.

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4. PROMOTING RESEARCH EXCELLENCE

The Excellence Initiative in Germany [1]

INTRODUCTION

Glorious History vs. Mediocre Accomplishments

The history of the oldest German universities – the University of Erfurt (founded in 1379), Heidelberg University (1386), the University of Cologne (1388), Leipzig University (1409), Trier University (1454)[2] – can be traced back to the middle ages. In the late 19th century, rivalling Great Britain and France, Germany became a centre for science in the world, and home of some of the most prominent researchers in many scientific disciplines (physics, mathematics, chemistry, and engineering, etc.). A considerable number of young people travelled to Germany to pursue the most advanced knowledge there. Nevertheless, when one refers the most prestigious universities of today, one probably may not immediately bring to mind any German universities, alongside the list of "big names" such as Harvard, Stanford, Oxford, or Cambridge. The performance of German universities in the global rankings, such as the Academic Ranking of World Universities (ARWU), QS World University Rankings, and the Times Higher Education (THE) World University Rankings – the three most influential and widely observed international university rankings – seems to sustain the impression (see Table 1).

Table 1. The best performance of German university in the world league table (2008-2013).

Rankings	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
ARWU	No.55 (6)	No.55 (5)	No.52 (4)	No.47 (6)	No.53 (4)	No.50 (4)
QS	No.57 (3)	No.55 (4)	–	No.53 (4)	No.53 (4)	No.50 (3)
THE	–	–	No.43 (3)	No.45 (4)	No.48 (4)	No.55 (6)

Note: The number in the parenthesis indicates the total number of German universities listed in the top 100 league table.
Source: based on the results of ARWU, QS, and THE World University Rankings.

In spite of the different indicators, these three league tables demonstrate similar results. That is, compared to their American and British counterparts, few German universities are included in the top 100 world university rankings. In the last six years, the highest rank that a German university has achieved is 43rd in 2010, while the total number of German universities among the top 100 is six.

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 31–46.

Staying Egalitarian vs. Pursuing Excellence

The Excellence Initiative aims to make the German university landscape differentiated, through breaking the traditional and matter of course in the German university system and building the top universities (Sondermann et al., 2008). In this regard, it is not similar to other research funding initiatives that aim to enhance the attractiveness of doing research in Germany. Unlike in America, there is no "Ivy League" in Germany. The German system, as well as university systems in many other European countries, follows a strong egalitarian tradition: each university is expected to offer research and teaching at the same level. Thus, German universities are only differentiated by their history (long or short) and scale (big or small), but not by their reputation (good or bad). Further, almost all universities are public,[3] mainly paid for by taxes. Therefore, theoretically, these institutions are egalitarian: all universities are equal and hence should be treated equally. However, such an egalitarian system with equal funding does not stimulate them to be ambitious or to exert themselves to become more competitive. Consequently, German universities either lack extra financial resources or are less motivated to seek excellence. Furthermore, because of the historic reasons mentioned above, any intention to launch a campaign, to seek any excellence or to choose a path of inequality by funding elites, is often regarded as taboo. Regarding this, when the former Minister of Education and Research, Edelgard Bulmahn, first put forward the idea of such a programme, it stimulated vigorous debate in both scientific and political circles in Germany.

Unity of Teaching and Research vs. Under-investment in Research

Centring research-oriented teaching and the transfer of knowledge from the spirit of research, Wilhelm Humboldt's ideal of the coexistence of research and teaching has become a model for universities all over the world. Non-university research institutions, such as those of the Max Planck Society, the Helmholtz Association of National Research Centres, the Leibniz Association, and the Fraunhofer Society, have strong traditions of research competency. Nevertheless, compared with other research institutions, the universities have advantages in terms of their multi-disciplinary nature, as well as having a unique function of educating and training new researchers (Huber, 2010). It is crucial, therefore, to strengthen research at universities. Research in any case in Germany is severely underfunded. In terms of expenditure on research and development, Germany is not only behind its Scandinavian competitors, but also Korea and Japan as well (see Figure 1). According to the UNESCO Institute for Statistics (UIS), Finland, Sweden, Korea, and Japan invested over 3 percent Gross domestic expenditure on research and development (GERD) continuously over the last 10 years (2002-2011), while Germany only invested 2.6 percent on average. Figure 1 indicates that the turning point appeared around 2007, since when Germany has constantly increased its GERD from 2.54 percent to 2.84 percent of Gross Domestic Product (GDP). The

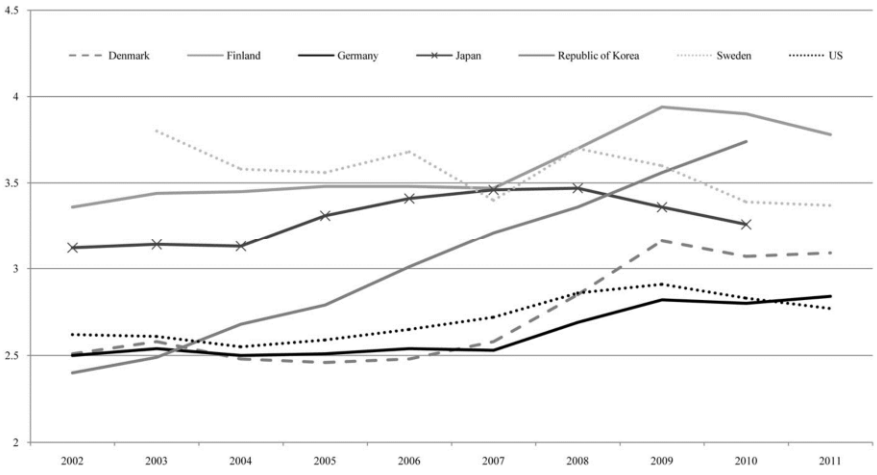

Figure 1. GERD as a percentage of GDP (2002-2011).[4]

Excellence Initiative was launched during this period, to promote research in universities by injecting more funding to the universities and strengthening cooperation between universities and non-university research institutions.

INITIATIVES: RESTRUCTURING GERMAN'S HIGHER EDUCATION LANDSCAPE

Purpose

Against this background, in 2005, Germany launched the first phase of the Excellence Initiative, aimed at making Germany a more attractive place to conduct research, paying attention to the distinguished achievements of German universities, and strengthening cutting-edge research in the scientific community. By initiating the programme, German universities were seeking to remain as a "lighthouse" in the scientific world, and to become as competitive as Stanford or Oxford in the global arena. Hence, the purpose of this competitive initiative was to break the egalitarian system and differentiate the universities by only supporting universities with the strongest research potential internationally. The launch of the initiative is therefore regarded as "the breaking of a taboo" (Kehm & Pasternack, 2009, p. 113).

Organization, Selection Procedure and Funding Areas

Organization. The Excellence Initiative consists of two phases, with three rounds. The first phase was between 2005 and 2012 and the second will be between 2012 and 2017. The first phase was held in two rounds: 2005/2006 and

2006/2007 (see Figure 2). The competition was run by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) and the German Council of Science and Humanities (Wissenschaftsrat, WR).

The first phase initiated substantial movement within the German university landscape and received great attention abroad, in spite of the financial crises, and the German government was determined to invest funding on research in 2009 for another five years until 2017, with increased funding of 2.7 billion Euros.

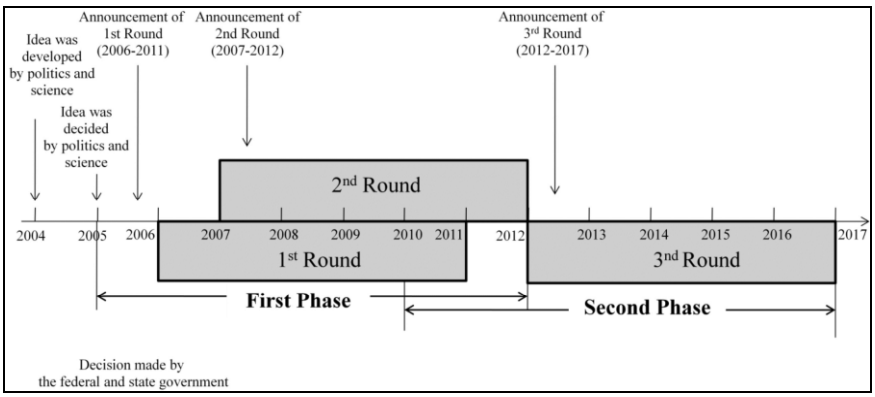

Figure 2. Timeline of the three rounds of Excellence Initiative.[5]

Selection procedure. Figure 3 shows the evaluation and decision-making procedure of the Excellence Initiative. The selection process is composed of a preliminary and a final stage respectively. In the preliminary stage, universities submitted a draft proposal, which was reviewed by internationally appointed panels of experts. According to the DFG, the commission was composed of approximately 300 experts, with about 60 percent being from other European countries and 30 percent from non-European countries, while the remaining 10 percent were from Germany (DFG, 2006).

The Excellence Initiative is composed of three areas, namely, Graduate Schools, Clusters of Excellence, and Institutional Strategy. Different commissions are in charge of assessing the application in each area. The applications for Graduate Schools and Clusters of Excellence are assessed by the "Expert Commission" of the DFG, while Institutional Strategies are evaluated by the "Strategic Commission" of the Wissenschaftsrat. The results of both parts come together in the "Joint Commission."

In the first round, about two-thirds of all German universities submitted proposals, of which 22 were selected for funding in all three funding areas. In the second round, 82 percent of all German universities submitted proposals, and 28 universities were chosen for competitive funding. In the final round, 41 percent (46 out of 111) of universities participated, while 39 won funding (DFG, 2012). In

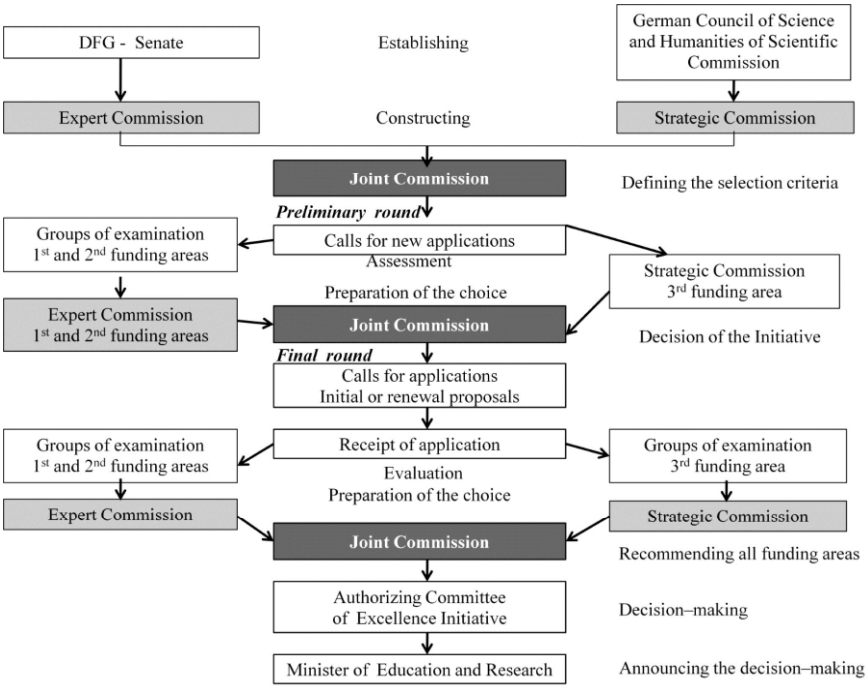

Figure 3. Evaluation and decision-making procedure of Excellence Initiative.[6]
Source: DFG (2014a).

terms of funding, three-quarters came from the federal government, while the rest was provided by the individual federal states. Altogether, about €5.3 billion will have been invested over the three rounds, comprising of €1.9 billion in the first round, €1 billion, in the second round, and €2.4 billion in the third round.

Funding areas. As mentioned earlier, the Excellence Initiative is composed of three areas, Graduate Schools, Clusters of Excellence, and Institutional Strategy (see Table 2).

Graduate Schools aim at promoting young scientists and researchers as well as training outstanding doctoral students. Figure 4 compares the classic "Master-Apprentice Model" and the structured Graduate School. Traditionally, doctoral education in Germany follows a "Master-Apprentice Model," which emphasizes the importance of a personal relationship between the students and their supervisor. Supervisors are responsible for the admission of doctoral students and evaluation of their thesis, while doctoral students often participate in their supervisors' teaching and research. Nevertheless, such a highly individualized model has been often criticized for its high drop-out rate, long duration, doubtful quality of

Table 2. Results of the three rounds of the Excellence Initiative.

	1st Phase		*2nd Phase*
	1st Round (2006)	2nd Round (2007)	3rd Round (2012)
Funding areas			
Graduate Schools	18	21	45
Clusters of Excellence	17	20	43
Institutional Strategy	3	6	11
Universities involved	22	28	39
Total (Euro)	1.9 billion	>1.0 billion	2.4 billion
% of elite Unis from former FRG	100%	100%	81%

Source: DFG (2014b).

supervision, etc. The intention of establishing Graduate Schools is to foster the training of doctoral students by providing outstanding structured doctoral degree programmes, an excellent research environment, and frequent communication between doctoral students and their supervisors. Furthermore, in Graduate Schools, doctoral candidates come together to work on projects related to a common interdisciplinary research topic. With the introduction of the Excellence Initiative, the procedure for doctoral training becomes transparent, in terms of recruitment and supervision agreement (DFG, 2013). In general, in the Graduate Schools, doctoral students obtain a broad set of skills, which enhance their personal, professional and career development. Currently, there are 45 Graduate Schools running with the DFG's financial support.

Clusters of Excellence focus the research potential at university locations and enhance scientific networking and cooperation among the participating institutions and industries. Under this scheme, the aspiration is to establish internationally visible, competitive research and training facilities. There are 43 Clusters of Excellence currently.[7] The "Centre for Advancing Electronics Dresden," for example, receives approximately €34 million in subsidies during the five-year funding period and currently 57 scientists and their teams from Dresden University of Technology and 10 other partner institutions (including the Max Planck Society, the Fraunhofer Association, the Leibniz Association, the Helmholtz Association and Chemnitz University of Technology) are working together in the centre. The Clusters of Excellence therefore stimulates new forms of cooperation between universities, non-university research institutions, and industries.

Table 3 shows the criteria of evaluating the applications in the Graduate School and Clusters of Excellence areas, respectively. The former attaches great importance to the research environment, concept of qualification, and structures, while the latter focuses on research, participating researchers, and structures.

Table 3. Assessment criteria for graduate school and cluster of excellence.

Graduate School	*Clusters of Excellence*
Research- and qualification-environment	***Research***
▪ Excellence of the of the participating researchers and research environment ▪ Contribution to the academic profile and structure-development of the universities and the faculties ▪ Requirements to a sustainable development of "culture of PhD students" ▪ Interdisciplinary approach ▪ International visibility	▪ Quality and originality of research and coherence of the whole research programme and individual research field. ▪ Interdisciplinarity ▪ The expected impact to the research field ▪ Application-oriented and cooperation partners (when applicable)
Concept of qualification	***Participating Researchers***
▪ Quality and originality of the qualification-concept ▪ Integration of doctoral students in certain research field ▪ Supervision-concept and strategies of supporting research-oriented career. ▪ International networking	▪ Quality and originality of the qualification-concept ▪ Concept of promoting young researcher in terms of the research training and career ▪ Concept of equality for man and woman in the research
Structures	***Structures***
▪ Organisation, management and structural support measures ▪ Cooperation with non-university institutions ▪ Concept of equality for man and woman in the research	▪ Inclusion the existing on-site resource ▪ Organisation and management ▪ Effect to the structure development of the high education institutions

Source: DFG & WR (2008).

To qualify for the third funding area, universities are required to win funding for at least one Graduate School proposal and one Cluster of Excellence proposal. Unlike the above two funding areas, Institutional Strategies are intended to strengthen a university as a whole, so that it develops top-level research and is able to compete successfully with the leading players in international science. The assessment of the institutional strategies is based on current research capability and the general condition of top-level research of the candidate universities (see Figure 4).

After the final round, twelve universities were awarded the titles of "elite universities."

There are two types of criteria: initial and renewal proposals. The main criteria rest with excellent research conducted within the universities, as well as with the

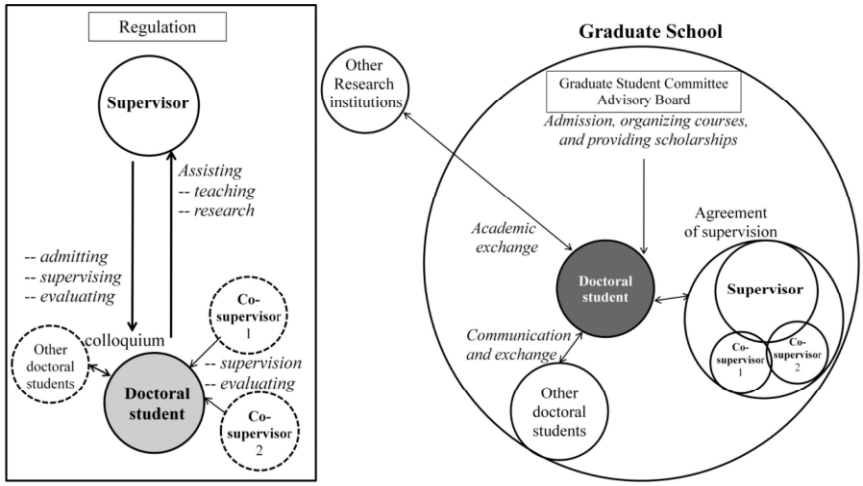

Figure 4. The traditional "Master-Apprentice Model" vs Structured Graduate School. Source: Zhu, Zhu and Liu (2013, p. 67).

Table 4. Assessment criteria for institutional strategies (initial proposals).[8]

Criteria	*Contents*
Status Quo	1. Research achievements 2. Institutional setting for top researchers at every career level 3. Research-oriented teaching 4. Capacity to act
Institutional Strategies	5. Plausibility of the Institutional Strategy in view of the goals of the funding programme and the Status Quo 6. Coherence of the Institutional Strategy regarding targets, strategic approach and measures 7. Innovative potential of the measures 8. Intended effects of the measures, regarding target groups and structures 9. Effects on teaching 10. Project organization and management at executive and operational levels 11. Adequacy of the proposed budget to meet institutional goals 12. Sustainability
Potential of the university for the sustained expansion of top-level Research (overall assessment)	13.Integration of the Institutional Strategy in the university's long-term planning 14. Foreseeable effects of the Institutional Strategy for the sustained expansion of top-level research at the university (including effects on teaching), at the location, and on the system of higher education and research 15. Likelihood that the university will improve its international competitiveness

Source: DFG & WR (2010, pp. 1-2).

increase of research competitiveness in the international arena. Table 5 shows the institutional strategies of the winning institutions in the second round of the Excellence Initiative.

Table 5. Institutional strategies of the Excellence Initiative in the 2nd phase (2012-2017).

Universities	*Institutional Strategies*
1. RWTH	RWTH 2020: Meeting Global Challenges. The Integrated Interdisciplinary University of Technology
2. Free University of Berlin	Veritas – Iustitia – Libertas. Strong Networks in Research and Teaching
3. Humboldt University of Berlin	Educating Enquiring Minds. Individuality – Openness – Guidance
4. University of Bremen	Ambitious and Agile
5. Dresden University of Technology	The Synergetic University
6.Heidelberg University	Realising the Potential of a Comprehensive University
7. University of Cologne	Meeting The Challenge Of Change And Complexity: Strategy for excellence in research and education in the future
8. University of Konstanz	Modell Konstanz – Towards a Culture of Creativity
9. Ludwig Maximilian University of Munich	LMUexcellent
10. Technical University of Munich	The Entrepreneurial University
11. Eberhard Karls University of Tübingen	Research − Relevance − Responsibility

Source: WR (2012a).

Monitoring and Evaluation

The success of the Excellence Initiative depends on whether the whole German research system becomes stronger or weaker by concentrating funding on top institutions or programmes (Sondermann et al., 2008), and whether universities are able to fully implement their plans and achieve their aims. It is in consideration of this that monitoring and evaluation matters.

The DFG is responsible for Graduate Schools and Clusters of Excellence, while the WR assists in the implementation of the Institutional Strategies. The monitoring includes advising the institutions, analysing documents and reports, organizing mid-term visits to the 11 universities awarded the Institutional Strategies, public relations, a reporting system, and organizing conferences and workshops (WR, 2012b).

Since 2007, the Institute for Research Information and Quality Assurance (Institut für Forschungsinformation und Qualitätssicherung, iFQ) monitors the Excellence Initiative for the DFG. In 2008 (two years after implementing the Excellence Initiative), the iFQ conducted the first round of evaluation by analysing

the text of the funding application, interviewing the speaker of the Graduate School and Cluster, examining the main data, and surveying the participating principal investigators. The purpose of the evaluation was to gain an impression and experience of the implication of the funding measures, so that both the achievement and emerging problems could be identified (Sondermann et al., 2008). Moreover, in 2016, an external commission of international experts is to evaluate the programme and its impact on the German higher education system.

THE CHALLENGE: DISCUSSIONS AND REFLECTIONS

Outcomes and Critiques

First of all, the Excellence Initiative has injected substantial research vitality into German universities. Although non-university research institutions (e.g. the Max Planck Society, the Helmholtz Association, the Fraunhofer Society, and the Leibniz Association) play a decisive role in research and innovation in Germany, universities also have their advantages when it comes to conducting research. By launching the Excellence Initiative, Germany has clearly demonstrated its determination to promote research in universities and its aspiration to intensify research cooperation between universities and non-university institutions. According to the statistics, between 2009 and 2012, Germany has invested approximately 18 percent of its research and development (R&D) funding on Higher Education Institutions (HEIs), while the share of investment of non-university research institutions has been decreasing. Up to 2009, within a very short period of time after its short launch, the Excellence Initiative had provided over 4,000 positions for doctorate students, post-docs, and professors[9] (see Table 6). All early-stage researchers (heads of junior research groups, post-docs and doctoral students) have the larger share of all these newly created positions. Given the low percentage of female researchers/doctoral students in the research field, who also often meet more challenges in terms of balancing research and family, the Excellence Initiative supports equal rights for male and female researchers as well. The latest information indicates that female professors (including junior professors) have received substantial support, as approximately 45 percentage are provided to female professors. Professors and young researchers from overseas have also been provided good opportunities (Sondermann et al., 2010).

Second, the Excellence Initiative has enhanced the international reputation of German universities for research. Although German universities have stayed in similar positions to where they were in the university rankings – only six universities have made it into the top 100 (as shown in Table 1 above) – the Excellence Initiative has achieved its original aim to a large extent. Shortly after the launch of first round, the Excellence Initiative caught the eye of the academic world, as it raises the visibility of German science and research with respect to international competitors. It is worth noting that Germany is among the forerunners

Table 6. Recruitment of research staff from the Excellence Initiative funding (Last updated: February, 2009).

Funding Areas	*Positions*	*Absolute number*	*Including females (in %)*	*Including those from overseas (in %)*
Graduate Schools	Professors	34	29.4	11.8
	Including Junior Professor	*16*	*43.8*	*25.0*
	Junior post-doctoral scientists	75	42.7	26.7
	Doctoral students	901	43.0	33.3
Clusters of Excellence	Professors	147	27.2	28.6
	Including Junior Professor	*55*	*34.5*	*38.2*
	Junior post-doctoral scientists	588	32.8	22.8
	Doctoral students	1323	34.6	17.5
Institutional Strategies	Professors	145	31.7	27.8
	Including Junior Professor	*28*	*57.1*	*48.1*
	All early-stage researchers	844	40.6	17.5

Source: Sondermann, Bukow and Simon (2010, p. 272).

of national research excellence[10] and many countries have followed the German model in launching their own programmes to pursue excellence, for instance, the Canada Excellence Research Chairs (CERC) programme (2008), Excellence in Research in Australia (2010), and the Operation Campus (2008) and the Excellence Initiative in France (2011).

Third, the Excellence Initiative has made German universities increasingly attractive to international scholars. According to the Alexander von Humboldt Foundation, the number of researchers coming to Germany from overseas for research visits increased by one-third between 2005 and 2009, especially in cutting-edge research fields, such as chemistry/pharmacy, biology and physics. Though German universities previously all had the same reputation, it is interesting to find that between 2008 and 2012, international scholars with excellent research performance have been drawn to the "elite universities," as among the top 10 host universities that hosted researchers with Humboldt Foundation awards, eight were/have been the elite universities (see Table 7). Obviously, both the Clusters of Excellence and Graduate School enable German universities to attract more international researchers to come to Germany to conduct research.

Fourth, the Excellence Initiative has created a culture of competitiveness across and within German universities (Huber, 2010). Undoubtedly, the Excellence Initiative leads to inequality in the funding of the "elites," which has triggered a culture of competition among German universities. Moreover, it has brought about a new vitality amongst the German academics, as many universities have begun to rethink their institutional strategies and research performance, present the uniqueness of their institutional profiles, and demonstrate strong competitiveness, all of which is without precedent in the German university landscape. In addition,

Table 7. German universities with the most Humboldtians (2008-2012).

No.	*University*	*Programmes*	*"Elite universities"*[11]
1	Free University of Berlin	294	√
2	Humboldt University of Berlin	269	√
3	Ludwig Maximilian University of Munich	266	√
4	University of Bonn	191	×
5	Heidelberg University	188	√
6	Technical University of Munich	169	√
7	University of Freiburg	159	√
8	University of Goettingen	141	√
9	University of Münster	141	×
10	University of Cologne	131	√

Source: Alexander von Humboldt-Stiftung (2013).

since the title of "elite university" is not permanent, universities have to stay competitive so as to defend this status. For instance, in the third round selection, the Karlsruhe Institute of Technology, the University of Göttingen, and the University of Freiburg, lost their elite status. Furthermore, as Huber (2010) suggests, such tension of competitiveness not only exists across universities, but also within universities, as some departments have been lucky to be awarded extra funding, enabling them to recruit excellent researchers, and purchase equipment and facilities, in contrast to those faculties which did not profit from this initiative.

The main criticisms of the Excellence Initiative can be divided into two aspects, namely, the fairness of distribution and the balance between research and teaching. In terms of fairness, universities located in the former Federal Republic of Germany (FRG) dominated in all three rounds of the elite universities. In fact, in the first two rounds, none of the universities from the former German Democratic Republic (GDR) gained the title of "elite university," but in the third round, two out of the eleven winning universities of the Institutional Strategy status came from the former GDR. Some argue that, except for institutional strategies, universities located in the new federal states actually have become very successful in the Graduate School and Clusters of Excellence. Furthermore, fairness also relates to the distribution of the winning programmes among various disciplines. Generally speaking, life science has gained more attention in terms of the distribution of disciplines in the Excellence Initiative, while engineering science gains relative less attention. The following figure demonstrates the distribution of percentage of Clusters of Excellence and Graduate School. In Cluster of Excellence, life science has gained 17 clusters (39.5 percent), followed by 11 nature science clusters (25.6 percent), 9 engineering clusters (20.9 percent), while social science has merely gained 6 cluster (14.0 percent). In the funding area of Graduate School, social science, on the contrary, has won the 17 schools (39.5 percent), while life science still gains 12 schools (27.9 percent), while engineering and nature science together

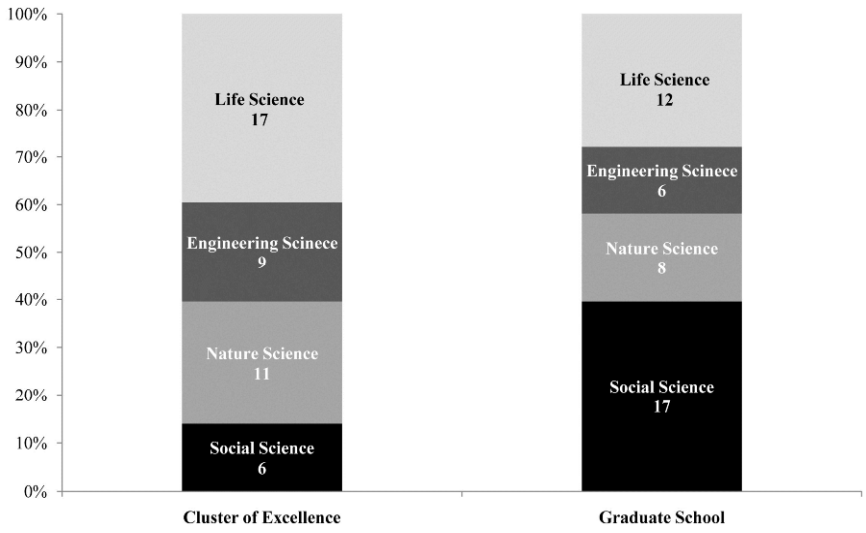

Figure 5. The distribution of winning programmes among disciplines.[12]

gains 14 schools (see Figure 5). Moreover, universities of applied sciences interrogate their legitimate right to have the access to the competition of the Excellence Initiative (Kohnhäuser, 2009), as they have been so far not "qualified" for the competition in the previous rounds.

As the elite universities celebrate their triumph, many have become worried about teaching in those institutions. Thus, the other criticism asks whether teaching and education is ignored. Rossler (2012) found no relationship between a university's research excellence status and conditions for studying in Germany. Nevertheless, the Excellence Initiative primarily aims to promote excellent research, instead of investing in teaching or education. Professors are expected to be involved in research, and it is possible that they therefore have less time investing in teaching. German universities are obligated to invest more in teaching, since the number of students entering universities has increased dramatically from 346,806 in 2000/2001 to 627,290 (see Figure 6). Although some might argue that from the very beginning the priority of the Excellence Initiative is to promote research, still, it is necessary for German universities to negotiate the discrepancy between mass Higher Education and concentrating research funding on certain universities.

Discussions and Reflection

Despite the above criticisms, the Excellence Initiative has been a ground-breaking programme in pursuing research pre-eminence and it has changed the scientific

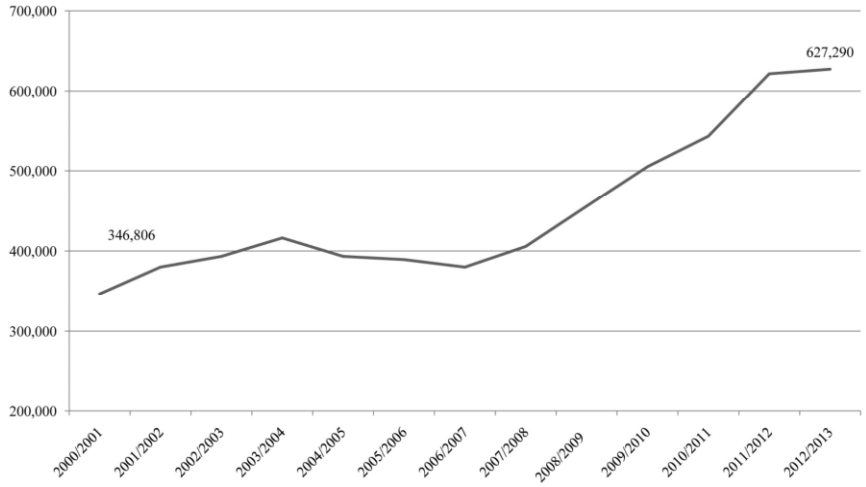

Figure 6. New entrant of German students from 2000/2001 to2012/2013. Source: HRK (2013).

landscape in Germany to a large extent. Germany is one of forerunners launching research-oriented excellence, and many countries shared the same motivation and launched similar initiatives by endowing research centres with considerable funds to conduct outstanding research. The Excellence Initiative has triggered a broad public debate about university research, priorities and specialization. The next step is to ponder how to sustain this and the long-term effects on the German universities. For instance, one of the concerns is how to re-motivate the "losers." Although some might worry about the negative impact of the failing results, a recent empirical study based on interviews with representatives of the winning institutions reveals that negative funding decisions have not discouraged the "losers," but to some extent, sent a "wake-up call" in pointing to shortcomings that had not been sufficiently dealt with in the past. For instance, those universities that had failed to win institutional strategy funding from the Excellence Initiative still made the decision to implement some of their proposed plan, even without the extra funding (OECD, 2014).[13]

NOTES

[1] This chapter is based on Zhu, Jiani. (2013). Building world-class universities: Excellence initiative in Germany. *Journal of International Higher Education*, *6*(3), 101-104.

[2] Charles University in Prague (founded in 1348) and the University of Vienna (founded in 1365) were the two oldest German universities in the Holy Roman Empire, while no longer on current German territory.

[3] Most private universities do not have the official German "Universitätsstatus."

[4] Source: UNESCO Institute for Statistics (UIS) Data extracted on 29 April 2014 02:38 UTC (GMT) from UIS/ISU. Data of Japan and Korea is not available in 2011.

[5] Source: Figure is compiled by the author, according to the information provided by the DFG website.
[6] The author translated the text from the original German language.
[7] Last updated on June 25, 2014.
[8] There is a specific criterion for renewal proposals as well. http://www.wissenschaftsrat.de/download/archiv/criteria_FA.pdf 2014-06-02.
[9] In Germany, only universities have the authority to grant doctoral degrees. Although not all these above positions are created by the universities, research institutions have to cooperate with universities to train doctoral students. In this case, universities benefit from the research human resources both directly and indirectly.
[10] For instance, China initiated the "Project 985" in 1998, Ireland launched Programme for Research in Third Level Institutions in 1998, and New Zealand established Centres of Research Excellence in 2001.
[11] "Elite universities" in either round within the two phase.
[12] Last Source: DFG, 2014 (last updated 30. April 2014).
[13] OECD (2014), "Chapter 6. The German Excellence Initiative," in OECD, *Promoting Research Excellence: New Approaches to Funding*, OECD Publishing. doi: 10.1787/9789264207462-9-en.

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5. TOP DOWN PUSH FOR EXCELLENCE

Lessons from Russia

INTRODUCTION

The publication of the results of the international university rankings in early 2000 shocked Russian policy makers and the professional community. They had assumed that the leading Russian universities were highly competitive. Russia was proud of its Soviet education legacy, which included universal secondary education, free high quality pre-school mass education; industry-oriented vocational education, and differentiated higher education system. This system was developed as a part of "grand project" by the Communist Party to provide highly trained and specialized personnel for the planned economy.

The main feature of this system was the desire to have a complete alignment between the quality and quantity of the graduates on the one hand and the manpower needs of the economy on the other (Carnoy et al., 2013). To achieve this objective, the Soviet government established a well-differentiated system of public higher education institutions which included more than 500 institutions (in Russia) at the beginning of Perestroika in 1991 (Froumin, Kouzminov, & Semyonov, 2013). Most of them were very specialized and belonged to more than 40 sector ministries. They formed a number of groups with quite specific missions: medical institutes, institutes for railway engineers, agricultural institutes, etc. The so-called "classical universities" had a more comprehensive nature (although they almost never had medical or engineering programs) and they represented an important part of this system. Their special mission was to train local and national managerial elites and personnel for the research institutes of both specialized research and development institutes and the institutes of the Russian Academy of Sciences. The whole system of higher education was quite hierarchical. Each specialized group included one or two leading institutions that performed methodological supervision of other institutions; they also trained professors for other institutions in the group. So there was an elite group even in a very homogeneous higher education system in Russia. These leading (elite) universities usually had twice as much financing per student than "average" universities; they also conducted research.

However, the distinctive feature of the Russian higher education system was its separation from research and development (Kouzminov, Froumin & Semeyonov, 2013). The Russian Academy of Sciences and hundreds of applied research and development institutions (affiliated with specialized industrial ministries) performed most of the knowledge creation and application, leaving the universities

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 47–63.

with the supply of personnel. The majority of professors had a relatively high teaching load because their research activities were not regarded as a priority by the university administrators. Graduate students at universities did not participate in large research projects conducted at the research institutes.

The picture, however, was more complex than this simple outline. The majority of researchers from the Academy of Sciences and specialized applied research institutes worked as part-time professors at local universities. They supervised graduate students and taught regular courses. There were examples when such part-time professors constituted the majority of teaching staff (Novosibirsk State University, Moscow Institute for Physics and Technology). Such universities considered in partnership with the research institutes could be counted as research universities. However, these were rather rare cases. Other rare cases were represented by few universities that included research institutes as semi-autonomous units, such as the Astronomy Institute at Moscow State University or the Mathematics institute at Kazan State University.

Even taking into account these exceptions, one can say that even elite Russian universities had weaker positioning as research universities, compared to their Western competitors. Most of the research funding went directly to the Academy of Sciences and specialized research institutes (Indicators of Science, 2007).

During the first post-Soviet years, this situation worsened because of brain drain and difficult economic circumstances. Many professors had to teach in a number of universities and they abandoned the research activities completely. According to the Indicators of Science provided by the Higher School of Economics, approximately only 10-15 percent of university faculty were active in research at that time (Indicators of Science, 2007). Another usual source of research production – graduate programs – also suffered. Scholarships for the graduate students were not sufficient to survive. As a result, the majority of graduate students had (and still have) to work full-time outside of the university. It made for very low productive graduate research and of low quality. Teaching at universities became very unattractive for researchers from the Academy of Sciences. The links between higher education institutions and research institutes became much weaker.

Discussions on the building of a knowledge economy in Russia often points to the separation of higher education from the research sector as one of main institutional weaknesses in the Russian knowledge sector. Strong arguments have been made in favour of creating in Russia a strong research university segment (Salmi & Froumin, 2013).

So when the first global university rankings (focused on research productivity) were published, the Russian Government was ready to take steps to increase the role of universities in knowledge production and innovation. However, this idea was not welcomed either by the universities or the research community. Researchers from the Academy of Sciences and other research institutes called for the restoration of the Soviet-type of research organization. Universities mostly found their niche in the new social and economic environment. They opened fee-paying programs in popular areas like management and law, neglected research

and tried to maintain the status-quo (Dobryakova & Froumin, 2010). So the Government faced a challenge to initiate a new type of university in Russia – modern research universities. This model was widely discussed in the literature of 2000s (Mohrman, Ma, & Baker, 2008). This chapter examines the instruments of government policy to revive research activities at universities and to encourage them to leave the convenient stability in search of a global competitiveness.

We examine three key steps undertaken by the Government before the full-scale excellence program that started in 2013. In the first step, two existing universities with good records of research productivity – Moscow State University and Saint Petersburg State University – were given a special legal status. They were also provided with significant resources for infrastructure development. They developed plans to improve their research activities and quality of education.

The second step focused on creating a network of strong universities with significant research component in the Russian regions. Nine such universities created from recently merged institutes of higher education are now searching for a development strategy to achieve competitiveness.

The third step was the creation of a network of 29 National research universities started in 2008 and has become a significant move towards a thorough institutional reconstruction of the higher education system. The universities chosen on a competitive basis have significant financial support and constitute a relatively new type of Russian higher education institute which is aimed at producing knowledge and innovation. This project also aims to weaken the traditional monopoly of research by the Russian Science Academy.

During the last four years there have also been other efforts towards the global competitiveness of Russian research universities. First, significant efforts were made to attract leading researchers in the world to Russian institutes of higher education. One of the examples of this is the "220 Project" which allowed the use of US$400m during the three years (2010-2012) directly for the development of world class laboratories at Russian universities by inviting leading international scholars to implement their projects in these laboratories (Government of the Russian Federation, 2010). This measure enabled not only the growth of research quality, but also stimulated openness of Russian universities to international knowledge circulation. It also acted as a catalyst for many universities to create similar laboratories using their own funds – not Government money.

One can say that the main strategy of movement towards greater global competitiveness of Russian universities focused on the measures to consolidate and modernize existing higher education institutions. This strategy is used in most countries solving similar problems, although in some countries (Hong Kong, Kazakhstan, Saudi Arabia, Singapore) new universities were created to accomplish this (Salmi, 2009). The only example of the establishment a new university in Russia in recent years (October 2011), which immediately focused on the highest global standards, is the Skolkovo Institute of Science and Technology (SkolTech), whose mission is to fill the existing gaps in the research spectrum, something critically important for Russian competencies and technologies.

The experience of more than five years of federal universities, the completion of the first stage of national research universities program (in 2013) and the first phase of the international laboratories (in the "Project 220" framework) requires in-depth analysis of the successes and failures of these Government actions for the future. We suggest some approaches to such analysis in this chapter.

Before we focus on specific projects we have to make a few clarifications:

First, higher education in Russia encompasses a wide range of institutional models (Abankina et al., 2013). These are not only "to-be" research universities, but also teaching institutions that conduct personnel training for the industry; the "general" higher education institutions that satisfy family desire for "some" higher education as a sign of social status; industrial and municipal colleges, "open universities" with part-time forms of education, and so on – and they all produce a variety of skilled specialists needed by the labour market than simply higher education diploma holders. Each type of institution carries out important functions, and it is often the main task for the government to balance the development of the various components of the system. The challenge for Government is not to shake the whole system but to build a new segment.

It is necessary to stress once again that in this chapter, as in all discussions about the world-class universities, the focus is on very specific type of universities – research universities, the major product of which is less well-trained specialists than new knowledge, technologies and competencies, "implanted" in people and presented in various forms. There is a consensus that the strength of research universities today is an important condition for the global competitiveness of nations and innovative economic development. Governments recognize the role of world-renowned universities in attracting talent from different countries (and especially their own talent). However, the Russian government has additional reasons to implement this model. It considers the creation of this new institutional form to be an element of the general social and economic modernization of Russia, and an element of the new openness of the Russian education and research sphere.

Second, there is always a question about the meaning of the words "world-class university." It is especially important when it comes to the assessment of the policies. When we try to evaluate the performance of these policies, unfortunately we have to use imperfect but the most common operational tool – the international rankings of universities. We are critical about the ratings. We are sceptical of the validity of many of the indicators and their weights. However, a comparison of different universities using the same indicators gives us an opportunity to draw meaningful conclusions and interpretations, so in this chapter we will use the rankings as one of the instruments to evaluate the progress of the Russian universities.

Third, the literature on the word-class universities tends to focus on the questions of institutional conditions and strategies to become better, more visible, and more international. As mentioned above, in the Russian case, the Government is the initiator. This is why we focus on the question of the role of the Government here, and its limitations and opportunities in creating a new segment within a well-established higher education system.

"NATIONAL TREASURES"

Moscow and Saint-Petersburg State universities always played leading role in the Russian higher education system. Special laws and generous subsidies created favourable conditions for their development. However, the universities did not develop innovative programs to achieve research excellence. Instead, the funding has been used to support existing structures and not for serious structural reform. Indeed, both universities appeared in the Academic Ranking of World Universities (AWRU). In 2012 Moscow State University (MSU) was 80th, and St. Petersburg State University in the 401-450 group. The Higher Education Evaluation and Accreditation Council Taiwan (HEEACT) has MSU the 12th in the world in mathematics. If we turn to a more subjective ranking, such as the Times Higher Education (THE) rankings or Quacquarelli Symonds (QS) rankings, where reputation plays a significant role in the evaluation, then the gains does not seem to be impressive (Table 1).

Table 1. Dynamics of Moscow State University and St. Petersburg State University in THE and QS ranking.

	The THE World University Rankings			*The THE World Reputation Rankings*			*QS*		
	2010-2011	2011-2012	2012-2013	2011	2012	2013	2010	2011	*2012*
MSU	Non (200 ranks)	276-300	201-225	33	non (100 ranks)	50	93	112	*116*
SPbU	Non (200 ranks)	351-400	non	non (100 ranks)	non (100 ranks)	non (100 ranks)	210	251	*253*

Source: QS World University Rankings (2013); THE World University Rankings (2013).

The Government respected the autonomy of these great institutions. It did not set demanding targets and indicators to provide incentives for them to improve faster. It also did not insist on rapid internationalization. Recently, both universities have started to establish new centres of excellence aiming at higher research productivity. It is too early to say if this is an important change, but one can suggest that these universities have become hostages to their great past. They can move forward in favourable environment but the speed of this progress cannot be fast.

"FEDERAL UNIVERSITIES" PROJECT

In the fall of 2005, the President of Russia set the goal of creating two universities of a new type of university in the Russian regions. There was no clear understanding of the form these universities would take. It was understood,

however, that the order referred to research universities that would help develop an innovative economy. Almost every Russian region expressed the desire for such a university to be created in its territory. The project generated interest from the professional community and spurred wider public discussion. This was the first post-Soviet case of focused state support for a higher education institution located outside the capital. It was also an interesting precedent of the mobilization of the significant regional support for the development of federally managed higher education institutions. One cannot underestimate also the brave move from the administrative top-down selection of the region and university to a kind of competition (even if the rules of this competition were not clear and transparent enough).

The main discussions were about whether to create this new type of university from nothing (a "green field" model) or on the base of existing universities (a "brown field" model). The arguments in favour of creating a new university according to the green field model are based on the risks of institutional inertia (Salmi & Froumin, 2007). However, the idea of developing major universities, created to have to the same combined capacity as a few regional universities, ultimately won out. The idea of creating a powerful multidisciplinary university on the territory where Russia's strategic interests are being presented, where the problem of consolidating the population and creating a new quality of life is critical, became the central for the launch of two pilot projects to establish federal universities in the south of Russia and in Siberia (Knyazev & Arzhanova, 2013). Another reason for choosing the "brown field" model was efficiency. Policy-makers wanted to create a strong university using existing resources and without too much expense.

Both the Siberian and the Southern federal universities were created by combining four universities in 2006.

This decision was formalized by a special law (18-F3) on 11 February 2009, which enshrined a new type of educational institution in Russian educational law: the Federal University. Article 11 of the Act defines the Federal University as:

An institute of higher education, which

- Implements innovative educational programs for higher and post-graduate education, which are integrated into the world educational space.
- Provides for the systematic modernization of higher and post-graduate education.
- Offers training, retraining and/or skills development for the all-purpose social-economic development of the region by using modern educational technology.
- Carries out basic and applied research across a wide spectrum of sciences. Ensures the integration of sciences, education and production, including channeling the results of intellectual activity into practical application.
- Is a leading scientific and methodological centre.

This was the first legal formalization of the tasks of a university, such as the mandatory development of a strategic plan, approval of this plan by the Government of the Russian Federation, the establishment of a Supervisory Board,

the right of the university to develop its own educational standards (curricula), and the appointment of a rector by the Government of the Russian Federation.

The passage of the law triggered an entire series of regional initiatives across all federal districts, all offering themselves as a springboard for the creation of new federal universities. There were over 20 of these initiatives.

In 2009, five federal universities were created. The Federal University of the Urals brought together the polytechnic and classical universities in the Urals capital. In Kazan, the Federal University of Kazan (Volga) was formed by joining a series of other institutes with the University of Kazan. In Archangelsk and Yakutsk, almost all local universities joined to become the Northern (Arctic) and Northeastern Federal Universities. In Vladivostok, the major classical and polytechnic universities were brought together along with other city universities from Vladivostok and nearby Ussuriysk to create the Federal University of the Far East.

With the organization of the Federal University of the Baltics in Kaliningrad in 2010, and the Federal University of the North Caucuses in 2012, which brought a number of Stavropol's universities together, the network settled into its current configuration.

In just eight years a group of federal universities were created across all of the major regions of Russia. Almost 40 universities merged into nine federal universities.

Figure 1. The federal universities map.

Today, the situation is as follows:

– There are 281,900 students studying at federal universities, including 167,900 full-time students (59.6 percent), of which 10,300 (6.2 percent) are full-time master's students.

– There are 23,500 faculty members at the federal universities, of which 15,700 (66.7 percent) have doctorates or Candidate of Sciences degrees.
– There are 7,100 PhD candidates, of which 4,700 (66.4 percent) are enrolled full-time.

The creation of these universities by means of unification led to serious difficulties with the formation of a new corporate culture, as shown by a special study carried out by the Higher School of Economics (Knyazev & Arzhanova, 2013).

First, it is unsurprisingly a difficult and slow process to form a new unified university culture. The researchers identified only two values shared by key managers of the university, namely a "results-oriented" approach and "the importance of personal responsibility and personal effectiveness." Conducting business on the basis of these values was deemed effective by high-ranking management.

Second, the corporate culture of these consolidated universities covers only representatives of the rectors' offices. It influences the middle managers to a lesser degree, while department heads are not covered at all. This leads to a situation where the majority of department heads do not adopt the new organizational culture. Therefore, many of the management's actions, decisions and values do not flow through to the departments.

Third, it is difficult to assimilate the values and particularities of the affiliate universities' cultures into a culture of a unified university. This causes a negative reaction from their representatives. These representatives perceive a loss of identity, largely because the values of which the original university was proud were embodied in its culture, but not reflected in the emerging culture of the unified university.

The problem of improving the quality of incoming students also remains a problem for the federal universities. The low quality of school graduates applying to federal universities limits the possibilities of not only elite, but even quality training of specialists for priority areas of knowledge-intensive scientific and technological development in the regions. Only two federal universities, the Volga and the Southern, have incoming test scores over 70 (out of 100), while the others are all in the 56-58 range.

During the implementation of the strategic plans in the Siberian and Southern Federal Universities from 2007 to 2012, there was a significant increase in the number of students studying for master's programs. At the Southern Federal University, this amounted to 9.35 percent (an increase of more than double), and at the Siberian Federal University the number of master's students grew 4.6 times to reach 6.4 percent. Overall, in light of the positive growth trends in the numbers of master's students in federal universities, the structure of their student bodies is quite different from the structure of the top-100 world universities. In these leading world universities, up to 40 percent of the students study graduate programs, while in our federal universities it is only 6.2 percent. In our opinion, there are reasons to be concerned, especially given the expected influence of federal universities on the regional vocational training systems associated with the development of master's

and doctoral education. For this reason, the government is heavily investing in the development of material and technical bases for education and scientific research in federal universities.

The progress of the federal universities could be indicated by their place in the world rankings. At the end of 2012, not a single federal university was appeared in the THE rankings or Shanghai's ARWU. In the QS ratings, only the Federal University of the Urals appeared in the 451- 500 range.

Six of the universities plan to enter the Times Higher Education rankings in 2019-2021, hoping to occupy spots from 350th (Kazan Federal University) to 100th (Northeastern Federal University). The analysis shows that to achieve these performance levels, the universities must radically change their development programs. For example, based on the 2011 figures, the university expected to occupy 300th place by 2019, the University of East Anglia (UK), has 1,930 publications each year, as indexed by Scopus, and £125m (US$6b, 250 million roubles) in research funding. Main research productivity indicators did not change quickly enough.

An analysis and comparison of development programs and a comparison with the real achievements of leading world universities shows that the federal universities face the following challenges:

- A relatively low quality of applications.
- An insufficient number of students studying masters' and graduate programs in priority areas with high research potential.
- Insufficient demand from local businesses for the universities to innovate in breakthrough sciences and technology. This includes the resulting lack of necessary development at the project and experimental phases, as well as certification and economic evaluation.
- Measures for developing potential human resources are ineffective in terms of increasing the scientific productivity and publication activity of the teaching and research staff.
- The lack of activity in terms of developing international partnerships and representing the university in the international academic space.

One can agree with the researchers who insist that, the potential of this project has not yet been uncovered. A mechanism for correcting university strategic plans is necessary in accordance with changing priorities in the socio-economic development of the regions, as well as a clear definition of these universities' mission (Knyazev & Arzhanova, 2013). It is not obvious that such large organizations should be built using only one model, namely the research university. Rather, it is necessary to liberate the research core and the units whose main purpose is the training of professionals for the development of regional economies.

NATIONAL RESEARCH UNIVERSITIES INITIATIVE

Decree 1448 of 7 October 2008 by the President of the Russia launched the National Research Nuclear University "MEPHI" and the National University of

Science and Technology "MISIS" as a pilot project. From the results of a competitive selection among university development programs in 2009 and 2010, the category "National Research University" (NRU) was set for another 27 universities.

Nine classical universities, 17 technical universities, a medical university, an economic university, as well as the Academic Research and Education Centre of the Russian Academy of Sciences, now have the official "National Research University" status. The greatest number of NRUs, eleven, is concentrated in Moscow, with another four in St. Petersburg. The largest number of NRUs (17) is in the priority field of development, information and communication technologies; 16 are focused on energy efficiency and energy saving; five universities are in the field of space technology; five universities are in medical technology; and a further three universities in the field of nuclear technology.

The network of the 29 NRUs can be characterized by the following consolidated figures (as of 31 December 2012):

– the total enrolment at NRUs is 458,800 students, including 300,200 full-time students (65.4 percent), of which 22.500 (7.5 percent) are full-time master's students;
– the total academic staff is 39,300, of which 28,900 (73.8 percent) have doctoral and Candidate of Sciences degrees;
– the number of postgraduate and doctoral students is 14,900, of which 12,100 (81.2 percent) are full-time students;

The total funding allocated from the federal budget for the National Research Universities development program for the period 2009-2012 is equal to 34.8247 billion rubles – about 10 percent of total revenue of these universities.

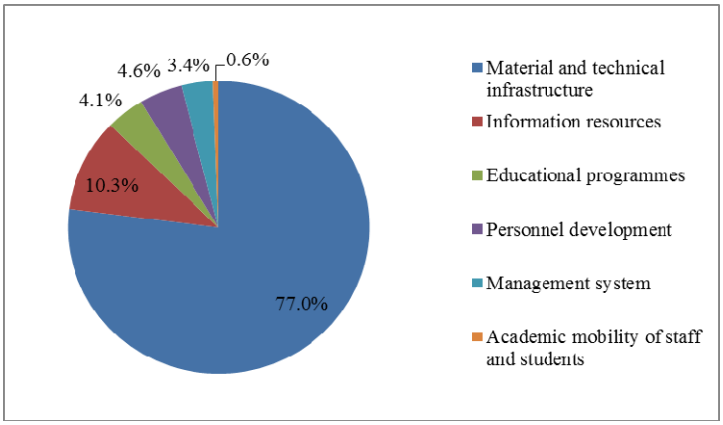

Figure 2. Spending within the NRU project.

In 2012, 77 percent of the federal budget finance was used to update material and technical infrastructure through the purchase of modern scientific and

educational equipment; 10.3 percent of the funds went to the development of information resources; 4.1 percent went to the development of educational programs; 4.6 percent on personnel development; 3.4 percent towards improving the management system; and 0.6 percent on the academic mobility of staff and students (see Figure 2).

Since 2009, the NRUs have developed their own original educational standards and 716 educational programs are based on these standards. Experience in the development and implementation of these standards allows us to formulate the following general characteristics of the new educational process in NRUs:

- ensuring graduates meet international learning outcomes, for example, in engineering education, the World-wide CDIO Initiative standards;
- increasing the values of general intellectual and cross-cultural competencies of graduates;
- increasing the role of student research and project activities.
- increasing flexibility based on increasing the number of elective courses;
- increasing academic mobility through the implementation of joint educational programs , including international programs;
- active usage of modern educational technologies and methods, strengthening their role in the educational process (information-communication technology, case methods, business games , etc.).

The situation with the quality of undergraduates at NRUs is better than for the federal universities, but the quality nevertheless varies considerably within networks of National Research Universities: the average score on the Unified State Examination in NRU networks is 73.9. The particular scores are: the Moscow Institute of Physics and Technology, 93.2; the Higher School of Economics, 89.0; Saratovsky State University, 68.5; Kostroma State Technological University and Kazan State Technical University, 67.4; Moscow Aviation Institute, 64.9; Perm Polytechnic University, 64.1; Kazan National Research Technological University, 63.7; and Irkutsk State Technical University, 61.6 (RIA News, 2013).

The average volume of research and development activities at a National Research University (measured by revenues from different sources) over four years (2009-2012) increased by three-and-a-half times and significantly (4.6 times) beyond the current level of the average for the country's technical universities: 960.8 million rubles in total, with about 205 million rubles a year at one university (Arzhanova, 2012).

In 2012, NRU academic staff, students, post-graduates and doctoral students published 29,325 articles in scientific periodicals indexed by foreign and Russian organizations (Web of Science [WoS], Scopus, Russian Science Citation Index), more than a 23 percent increase compared with 2011. During the implementation of the NRU development programs during 2008-2012, the quantity of indexed publications by an average for one university increased by almost three times. At the same time, the absolute figures were low. 12.7 percent of the Russian publications indexed in the WoS were NRU publications. Only 17 percent of NRU publications from the s are indexed by the WoS, with Novosibirsk State University

having the highest at 39.9 percent, and Kazan State Technical University the lowest, at 0.4 percent.

National research universities are actively and effectively participating in open competitive tenders aimed at government support for co-operation with universities with existing business in order to develop high-tech industries, promote innovation, and the involvement of leading foreign research scientists.

Key management efforts at universities are aimed at the creation of conditions for the effective work of academic staff, including the establishment of effective systems of motivation to improve research productivity and the innovation activity of academic staff and students (Kastoueva-Jean, 2013).

In 2012, the share of doctors and Candidates of Science engaged in teaching and research in the NRUs increased from 70.4 percent in 2011 to 73.8 percent. Since 2009, the share of academic staff under the age of 49 years old increased steadily and had reached 49.8 percent by the end of 2012.

All NRUs spend significant resources on staff training and retraining in the world's leading research universities. The number of the professors and graduate students who underwent such training increased by 3.6 times in 4 years to reach 8,342 in 2012.

NRUs implement a variety of programs and projects for the development of staff, including the strengthening of selective incentives. All NRUs are taking steps to ensure the inflow of young, creative, active academic staff. They develop such instruments as targeted scholarships and grants to perform research, special support for internships at leading academic centres, as well as at high-tech industrial companies.

National Research Universities use a significant part of the targeted Government funding to strengthen physical infrastructure: 127 laboratories were modernized and equipped; new sites for testing innovative technologies and the commercialization of science-intensive products were created.

A number of NRU established science and technology "Foresight" centres, to perform the forecasting and evaluation of technological trends and development scenarios.

A significant result of the NRUs strategy implementation is the creation and development of innovation infrastructure: creation of technology transfer centres, business incubators and technological bureaus, pilot plants, industrial parks and other infrastructure.

The development of university management systems was as follows:

- Developing information management systems, including the modernization of information-telecommunication infrastructure; establishing the learning management systems; and providing access to Russian and international information resources.
- The improvement of quality management systems in terms of their certification; the development of measures for the quality assessment of educational services; and accreditation of educational programs at the national and international levels.

Overall, the primary outputs of the National Research Universities quality management improvement include:

- the creation of university standards for the development of basic educational programs and disciplines, for the development of programs and modules with credit-module structure and the assessment of educational outcomes;
- development, in collaboration with employers, a list of competencies that ensures the competitiveness of graduates in the labour market, and their certification;
- development of materials that measure learning;
- co-ordination of quality management systems in education and science in compliance with ISO 9001:2000, and systems certification to the specified standards.

Internationalization has become one of the key aims of the NRUs strategic plans. Its implementation included: the promotion of the educational services of these universities abroad; participation in international educational and research projects; co-operation with international organizations; and the organization of events with international participation.

In order to promote their educational services abroad, all of the universities took measures to: increase information about the universities for foreign audiences; prepare and implement educational programs in foreign languages; and improve living conditions and security for foreign students. As a result, the share of international students at NRUs in 2008-2012 increased nearly twofold.

The positioning of the National Research Universities in the international system of higher education institutions can be characterized by their position in the global rankings. At the end of 2012, none of the NRUs were represented in Shanghai's ARWU, but in the THE ranking, NRNU "MEPHI" was ranked 226-250. In the QS Ranking, Bauman University has 352nd, Novosibirsk State University 371st, the Higher School of Economics in the 501-550 group, Tomsk State University, 551-600, and both Tomsk Polytechnic University and the Lobachevsky State University of Nizhni Novgorod in below 600.

One of the reasons for the lack of presence of NRUs in the international rankings is not just poor academic performance but also their weaknesses in representing themselves in the international academic space: the full English language sites are poor, there is slow implementation of international peer review of different aspects of university life, and there are barriers to academic mobility. NRUs do not pay sufficient attention to comparative evaluation and the implementation of measures to promote the international image of universities.

In general, one can say that this program has had a greater success than the "Federal universities" project. At the same time, though, we have to note that the group of 29 universities became even more diverse than at the beginning of the project. The most active universities increased research productivity, educational innovation, and commercialization. Others have been waiting and spent money not on innovation but to fill the gaps in the existing process. This policy proved to be inefficient (Fedukin & Froumin, 2010).

LESSONS

The lack of the effectiveness of these projects is in need of serious analysis. Failure or delay of movement by Russia in this direction could result in a leakage, or insufficient supply, of talent and, as a consequence, serious risks to the global competitiveness of the universities and the country as a whole. An analysis of the "Federal universities" and "National Research Universities" projects allows us to draw important lessons for further policy actions in the "race to the top."

The first lesson is the role of pre-project stage. Universities developed their strategies in a hurry, to win a competition. They did not have the time or desire to do a thorough preliminary analysis of different opportunities, to engage external stakeholders in discussions of possible goals and the means to achieve them. They set unrealistic expectations which have led to an unacceptably "laid-back" project implementation, and have made project outcomes practically unattainable.

The Government did not pay enough attention to the current stage of the development of the participating universities. The lack of a pre-determined eligibility criteria for institutions to participate in the competition-based selection process for National Research University status, as well as the fact that Federal Universities were often established without a realistic assessment of the potential of those merged institutions, has caused dramatic discrepancies in the initial conditions that universities had for the implementation of their proposed and approved development programs.

The development of the strategic plans for federal and national research universities happened too quickly without a proper external evaluation.

The second lesson is about flexibility in financing. At the program development and approval stage, strict limits were set on the national research universities for the use of allocated funds. The financial resources could be used exclusively for the purpose of purchasing laboratory, training and research equipment; further training and professional development of academic staff; curriculum development; information resources development; and improving the quality of the education and research management system (according to Decree 550 [13 July 2009] of the Russian Federation Government), finance for research (including international research projects) was not available, and the universities were also forced to spend all of the funding allocated for that particular year. All this led to inefficiencies and a lack of project-based funding and planning.

The third lesson is about the flexibility in implementation. No mechanism has been put in place to promptly adjust the universities' development programs in line with the changing social, economic and technological development priorities in the regions and industries that would ensure they correspond to newly adopted programs and legislation in the fields of education and science, at both the national and sub-national levels, as well as in the case of the substantial reorganization of higher education institutions in the educational network optimization framework. As a result, the program performance evaluation indicators, which were established for a 10-year period, and the contents of events that are being evaluated, have become considerably outdated and unrealistic.

The fourth lesson is openness and transparency in institutional development, especially in improving learning. Teaching materials produced by professors in large quantities were not properly reviewed and made fully available to the public through institutional websites. These are not easily accessible to the academic community, as well. As a rule, materials produced by universities are out of reach to independent peer-review – unless universities volunteer to submit their educational programs for public and professional appraisal, for national or international accreditation.

The fifth lesson is about the importance of focus. Most universities have failed to work out an efficient system to stimulate scientific publications by the faculty in peer-reviewed literature and indexed by international citation services. As to domestic publications, they are undermined because of a lack of systematic efforts in Russia to promote the inclusion of prominent national publications into international peer-review databases and citation indexing services. When it comes to positioning within the global higher education system, it turns out that the Universities' development programs and performance evaluation indicators have not been targeted to achieve particular results, which can be fairly objectively mirrored by institutional global ranking positions. As a result, universities have largely underestimated the importance of comparative evaluation/benchmarking, falling short on building their institutional image globally, as well as on improving their institutional development outcomes by achieving high ranking positions against these internationally acknowledged performance evaluation indicators.

The sixth lesson is about the importance of national partnerships. The implementation of the strategies showed that universities that had strong links with the Academy of Sciences, with successful companies, and with regional authorities, managed to achieve their results faster. The partnership with the Academy of Sciences proved to be very effective for growth in research productivity.

The seventh lesson is about the importance of courage to make real changes to the management structure, to teaching and to international co-operation. Those universities that created new units to perform new tasks and hired new people for these units showed better progress. Those universities that used fully their right to create their own educational standards (and improved the teaching of English and developed English-language programs) attracted better students and young professors. Those universities that opened new research units for bright researchers (including young and foreign) proved to be more productive.

The eighth lesson is about time. It is unrealistic to expect quick results in this field. The formation of advanced scientific groups even when key competencies are imported is at least three to seven years. Therefore, the lack of progress among Russian research universities can be explained not only by their low zeal and irregular organization, but also insufficient time for significant results.

The ninth lesson concerns adequate funding. The slow progress of the Russian research universities can be partly explained by inadequate and poorly concentrated investments. . Buying half of the equipment, or to attracting foreign scientists, but not funding translation, is a half-measure and a waste of resources.

NEW INITIATIVE

The understanding of the importance and complexity of Russian universities competitiveness goals is shown by political leaders and the Decree 599 (7 May 2012) by the President of the Russian Federation, and the State Education Development Program, in which a goal was set to have by 2020, "at least five Russian universities in the top one hundred of the world's leading universities according, to the world ranking of universities."

By offering such a formulation, of course, Russian leaders do not mean just the achievement of a formal parameter in a particular list. The goal is to dramatically accelerate the achievement of the advance team of research universities in global competitiveness. Russia is not the first country to set such a goal.

The new Russian excellence initiative is not free from simplifications and unrealistic expectations. However, in designing this initiative, the Ministry of Education has tried to use the lessons learned.

The decision was made to increase the financing of this program by three times (per university) and decrease the number of universities to 15. Each university should develop its own original strategy to improve its global competitiveness. This strategy should be discussed with a number of expert bodies and stakeholders before it is finalized.

The Ministry delegated the steering of the project to the International Council, representing leading higher education reformers from three continents.

The universities received greater autonomy (including in the spending of a government grant) in exchange for greater transparency and accountability: one of the conditions of awarding the grant was the establishment of a governing board at each university with the right to appoint the university president.

Each year the International Council will evaluate the progress of the project's implementation and suggest necessary corrections. These institutional arrangements should help to improve the international competitiveness of the leading research universities in Russia with greater effectiveness and efficiency.

ACKNOWLEDGEMENTS

The authors would like to thank I. Arzhanova; E. Knyazev; Y. Kuzminov; J. Salmi; and V. Zhurakovsky for their valuable data for the chapter and useful discussions, as well as M. Lisyutkin for editorial help.

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6. THE KOREAN GOVERNMENT'S POLICIES AND STRATEGIES TO FOSTER WORLD-CLASS UNIVERSITIES

INTRODUCTION

With the increasing awareness in the 21st century of human and educational "invisible resources," which contribute to national wealth, governments around the world over the past decade have been establishing and conducting various policies in order to develop their universities as world-class institutions. Korea is no exception and has many exemplary development policies, such as: a development policy for specialized universities; an inductive policy for the reconstruction and reintegration of school structure; a policy for university competitiveness; a policy to improve university competiveness by building infrastructure and academic clusters; a policy to revitalize research through industry-academic co-operation and the strengthening of links among regional businesses; and a policy to enable global universities to build branch campuses in Korea. With a current population of 50 million, Korea has 45 public national universities and 156 private universities, totaling 201 universities with four-year degree programmes. The current number of university students is 2.2 million.

The Korean Government has been implementing numerous policies to foster globally prestigious universities by strengthening their academic and research competitiveness. The Brain Korea 21 (BK21) programme, which has ran since 1999, is one of them. The BK21 programme focuses specifically on developing universities by strengthening the research competiveness of graduate schools and supporting both master's and PhD students, as well as researchers, including post-doctoral and fixed-term professors. The World-Class University (WCU) project also ran between 2008 and 2013. This project has developed human capital, equipping individuals with creativity and practical skills, who can then contribute to the national wealth. In addition, it has worked to establish the best lineup of professors and attracted talented individuals from around the world to Korea.

In 2013, the Korean Government launched the "BK21 PLUS" project, which integrates the BK21 project and the WCU project. This project is to run for seven years, from 2013 to 2019. The BK21 PLUS project will analyse issues running in real-time and aim to enhance the quality of higher education and research. This chapter will explore the accomplishments and problems of past policies and identify new plans and strategies for improving higher education which could be realized within the BK21 PLUS project.

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 65–83.

Brain Korea 21 (BK21, 1990-2012)

Outline. The BK21 project aimed at training and educating the next generation of creative scholars and research-focused universities by specifically supporting master's and PhD students, as well as post-doctoral and fixed-term professors. This project ran for 14 years, from 1999 to 2012, going through 2 stages. For the first stage, which lasted seven years from 1999 to 2005, 1.3 trillion won was invested, and for the second stage, lasting the following 7 years from 2005 to 2012, 1.8 trillion won was invested. The academic fields invested in were as follows: Basic Science and Technology, Applied Science and Technology, Humanities and Social Sciences and Professional Service Studies (see Table 1).

Table 1. The Academic fields of the BK21 project.

Section	*Academic Fields*
Basic Science and Technology	Mathematics, Physics, Chemistry and Biology, Earth Science
Applied Science Technology	Information Electronic Machinery Material, Chemical Engineering, Construction, Applied Biology and Energy Environment
Humanities and Social Science	All Areas of Humanities and Social (Design Video included)
Professional Services	MBA, Dental and Medical Science

Source: National Research Foundation of Korea (2011).

The financial report on the BK21 project shows its spending on the personnel expenses of graduate students, expenses relating to international affairs and some business expenses. In terms of statistics, the expenses of graduate students and post-doctoral students accounted for 80 percent of total expenses.

The Results of the BK21 Project (Stage 2: 2005-2012). A total of 1.8 trillion won was invested in the second stage of the BK21 project, 75 percent (1.3 trillion won) went to outstanding national graduate schools, and 25 percent (446 billion won) to outstanding regional graduate schools. The concept of a balanced national development policy can be seen through these figures. In academic areas, 59 percent was invested to applied science and technology, 20 percent to basic science and technology, 14 percent to humanities and social sciences and seven percent to professional service studies (five percent to dental and two percent to medical science). As of 2011, 6,555 Korean professors had participated in the BK21 project. This accounts for 11.3 percent of the total number of Korean professors. 36,000 graduate students joined the BK21 project annually, which accounts for 22.3 percent of the total number of graduate students. Moreover, 15,319 of new researchers, including both post-doctoral and fixed-term professors, have received

the benefits of the BK21 project. This ensures that the BK21 project is an indispensable resource that enables these beneficiaries to continue their research activities until they can secure stable jobs.

The Accomplishments of the BK21 Project. The BK21 project served as an important trigger for an increase in the research capacity of graduate schools by increasing the number of master's and PhD students, and researchers. An average of 36,588 graduate students applied to the project annually, and this result was particularly visible in basic science, technology, and the humanities and social sciences. Regional graduate schools were also able to benefit the most. Taking a look at the number of doctoral students, an average of 2,655 was hired annually, and the true ratio of hiring increased to 88.7 percent (basic science and technology to 88.9 percent, applied science and technology to 89.1 percent, and humanities and social sciences to 87.9 percent).

The research competitiveness of BK21 beneficiary schools increased immensely. The number of schools in the top 300 of the Quacquarelli Symonds (QS) world ranking increased from four in 2005 to seven in 2011, and a total of five universities (Seoul National University, the Korea Advanced Institute of Science and Technology, Pohang University of Science and Technology, Yonsei University and Korea University) made the top 100.

The improvements to university systems and growing numbers of graduate and doctoral students have resulted in the stronger research competitiveness of universities. By financially supporting students, the project lowered the financial burden universities had to bear, and this led to a better quality of research, resulting in higher efficiency.

By attracting students across the world, the BK21 project helped regional universities to have a more talented workforce. The ratio of international students in outstanding regional universities is 14 percent, which is twice as high in comparison to national universities (7.2 percent) and this was an increase from 11.6 percent in 2007. This has enabled regional universities to become more global.

The BK21 project provided an opportunity for students in need to go to graduate schools with a scholarship. In addition, the employment rate is higher for BK21 project beneficiaries (91.5 percent) than regular graduate students (82.2 percent). Scholarships have enabled students to focus better on their research, and this has resulted in the growth of the number of theses per person, especially in the humanities and social sciences (see Figure 1).

The BK21 Project has also equipped participating students with a global sense by inviting them to international conferences. 88 percent of students continued participating in international activities, including seminars and international exchanges.

The increase in research and the improvement in research power in universities have contributed to the creation of excellent research. Participating professors wrote 54 percent of all research papers nationally. It appears that, as time passes, the differences between the results from all universities and the results from the BK21 participant universities increased from the perspective of the number of SCI

papers and Science Citation Index-Impact Factor (SCI-IF) papers, especially in the application of scientific technology. The application of scientific technology showed a significant rate of growth in SCI level and IF papers, compared to basic scientific technology (see Figure 2).

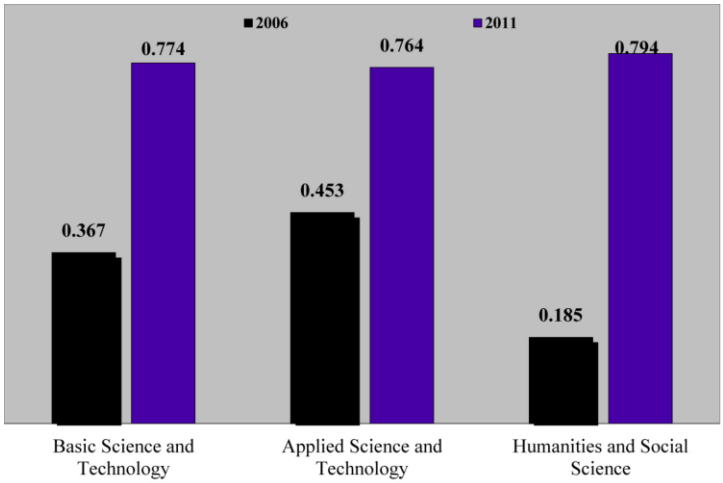

Figure 1. The number of thesis papers per graduate school student participating in the BK21 project.
Source: National Research Foundation of Korea (http://www.nrf.re.kr).

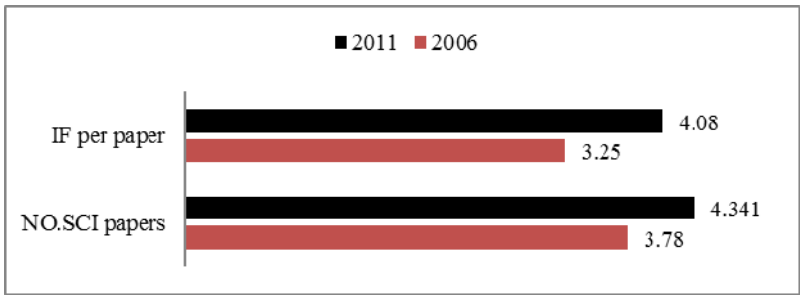

Figure 2. The number of SCI papers and IF papers of basic science and technology.
Source: National Research Foundation of Korea (http://www.nrf.re.kr).

It also contributed to an increase in the amount received in government research support by improving the research power of graduate schools. The result of receiving government research aid for professors who participated in the BK21

project appeared to be three times higher than those of other universities. The rate of increase in the field of humanities and social sciences was especially high.

The BK21 project strengthened co-operation between universities and industry, which in turn increased the research support from industry. This mainly had an effect in the field of application of scientific technology. Professors receiving support from the BK21 project received three times per person more in research grants from industry than the average for professors at other universities. Nine million won per professor was given in research support by industry in 2010, in comparison with 30 million won for a BK21 professor. Research aid from industry to the application of scientific technology increased four-fold between 2009 and 2011, as a result of participating in the BK21 project.

The project has contributed to improving the ratio between college students to graduate students by reforming the graduate school system and creating an educational environment which focuses on producing graduate students. The ratio between college students to graduate students was 2.86:1 in 2005 and it improved to 2.56:1 by 2011. The ratio is smaller in national graduate schools (1.73:1) than regionally acclaimed graduate schools (5.99:1). The BK21 project also created an environment where graduate students could receive a better education by improving the ratio between graduate students per full-time staff members, from 7.04 per student in 2005 to 6.27 per student in 2011, through promoting reforms to university organization.

World-Class University, 2008-2013

Outline. The project aimed to train world-class, research-focused universities (World Class Universities, WCUs) by inviting overseas scholars that have greater research power, such as Nobel Prize laureates, to Korean universities in order to strengthen a university's education and research power and promote research that focuses on critical fields that are good for the country's future development. It gave concentrated support to areas that helped new development, and that can internally or externally fuse and merge with other fields.

What makes the WCU project different from other projects is an improvement in global recognition through the globalization of the professoriate, and the invitation of world-class, renowned professors, in order to strengthen international competitiveness; the creation of a new value-creating system of exchange between professors and their studies; the aiding of symposia and international collaboration on research projects with globally distinguished professors, by strengthening international networks between them; and so on.

Moreover, in order to strengthen the competitiveness of the professoriate it made possible a simple method of selection and autonomy in various aid packages, for the improvement of quality in the research ability of professors, leading to more effective research and education.

The projects aimed to supervise investment and achievement creatively in order to improve global recognition, and encourage the introduction of an international achievement supervisory system as a research incentive system. It also prevented

the outflow of talented students and invited talented overseas students by improving the competitiveness internationally of Korean universities. It pursued the improvement of competitiveness at the school level by adopting an aid system at departmental or faculty level within the universities.

The result of pushing the WCU project. The WCU project lasted from 2008 to 2012. A total of 825 billion won was awarded, with support from industry (2011 shown Table 2). Supported areas were those that fostered development and the convergence of high value areas by mainly developing creative knowledge and innovative technology, based on the humanities and social sciences, the natural sciences, engineering, and bio-engineering. All these areas based their thinking on international scholars participating in the project: of the three types of project, the first project type supported established degree majors and departments; the second type invited individual scholars; and the third project type invited globally renowned scholars.

Table 2. The three types of the WCU project (2011).

Type	*Content*	*Number of University*	*Number of Projects*	*Number of Foreign Scholars*	*Funding*
1st Type: Establishing Specialty and Department	Full-time international and Korean professors participating together to establish specialty and departments	19	34	206	1.069
2nd Type: Inviting Individual Scholars	Full-time international scholars into existing department in the university to give lessons and produce joint research	18	44	72	358
3rd Type: Inviting Famous Global Scholars	Inviting renowned global scholars on a part-time basis to offer classes and produce research	26	62	64	121
Total		33	140	342	1.548

Source: Korean Ministry of Education (http://www.moe.go.kr).

The BK21 project mainly funded "project groups" based on specific majors; however, the WCU project increased the competitiveness of individual college departments by simplifying the evaluation, and by expanding the formula for funding and block funding. Moreover, by using formulas based on achievement, it guided universities to achieve focused supervision and automatic decision-making in its awards.

Additionally, the WCU project kept the principle of world-class research focused on universities. It selected and supported the universities that had the

potential to develop world-class university status and to achieve greater global competitiveness by effectively using limited funding and investment. It also encouraged management and creative businesses, and used a business focus through its interactions. Moreover, it selected a strategic investment area but left the standards for enrollment and business operating measures to be made by the selected university, to respect their independence.

As a result of the WCU project, the universities that were included in the top 200 of the QS World University Evaluation increased from two in 2007 to six in 2012. Overall, 33 universities participated in 140 projects, and 342 international scholars were recruited, including nine Nobel Prize laureates, to contribute to an increase in reputation in other countries and reformation of the universities' research practices.

The Achievements of the WCU Project. The WCU project increased the research results for Korean professors. The project groups published 22 papers in highly accredited SCI Journals: Nature, Science, and Cell. 5,736 papers were published in SCI level journals and among these, 2,271 (39.6 percent) were published in SCI's top 10 percent of journals, and 81 (1.4 percent) in the SCI's top one percent of journals (see Table 3).

Table 3. Papers supported by the WCU project (December 2008-August 2011).

		Type 1	*Type 2*	*Type 3*	*Type 4*
Total Number of Papers		3,709	1,613	414	5,739
NSC		17	3	2	22
Publication Year	2009	583	188	56	827
	2010	1,561	677	177	2,415
	2011	1,565	748	181	2,989
Global Excellence Journals	Internationally Renowned Journal	4	3	3	10
	SCI	3,308	1,483	347	5,138
	SCIE	231	76	54	361
	SCOPUS	111	10	5	126
	SSCI	54	37	2	93
	Other	1	4	3	8
Top 10%		1,548	622	101	2,271
Top 1%		61	16	4	81

Source: Yu (2012).

Compared with before the WCU project, the number of papers published in the top 10 percent SCI-level journal per person and the IF per person for SCI level paper have increased by a factor of 1.3. The number of papers published in the highest 10 percent of SCI journals increased by 29 percent, from 1.31 before the

WCU project to 1.69 afterwards. Also, the IF per person in SCI level papers increased by 30.2 percent, from 13.61 before participating WCU to 17.65 afterwards (see Table 4).

The WCU project brought an increasing effect in the base of QS Asia University Evaluation Standards: 35th in engineering, 72nd in bio-engineering, and 46th in the natural sciences (see Table 5).

The first project group of the WCU project established 32 new departments and majors. Of these, 16 combined academic areas, fusion departments and majors that were newly established to construct the infrastructure to educate inter-discipline personnel. The students were also satisfied with newly established departments, majors and classes by international scholars. The result of multidisciplinary studies, classes by overseas scholars, and foreign languages, have been greatly reformed and changed into a system to nurture globally talented students with an international research focus in universities and multiple degree systems.

Table 4. The papers of the graduate students participating the WCU Project (December 2008-August 2011).

		Type 1	*Type 2*	*Type 3*	*Total*
Total Number of Papers		683	1,565	145	2,393
Type of Journal		275	477	91	704
Publication Year	2008		11	2	13
	2009	59	447	49	555
	2010	277	617	60	954
	2011	347	490	34	871
SCI	Y	612	1,392	127	2,131
	N	71	173	18	262

Source: Yu (2012).

Table 5. The ranking changes of academic areas after WCU project participation.

Rated Areas	*The Ranking changes after WCU*
Engineering	35
Life Science	72
Natural Science	46
College-level (Colleges Ratings)	91

Source: Jang (2011).

For the 32 project groups of the first type, 69 international experts in nine sections achieved “excellent” in research planning, and research results, in comparison to other leading global universities. 29 (91 percent) of project groups showed progress in research planning, and 28 (88 percent) of project groups for research results received “above excellent” in their evaluation. Moreover, 27 (84 percent) of project groups received an evaluation of “above excellent” for mutual research with leading global universities.

For the 47 project groups of the second type, 83 international experts of 11 sections were evaluated as excellent as a whole, but it appeared lower compared to project groups of the first type; 35 (74 percent) project groups received excellent grades in progress of research plans and 37 (79 percent) received good grades in research results. By looking at the evaluation of overseas scholars, the overall ratings by international experts of the WCU project group were positive.

As stated above, the WCU project sought to reform the education and research conditions of Korean universities by inviting overseas scholars who have a higher research capacity and employing them as full-time professors for over three years, in order to achieve a substantial synergy through joint research, on the premise that it would be difficult to develop world-class research-focused universities with only Korean professors. This had the effect of increasing the feasibility and objectivity of evaluation, as well as choosing a project that meets international demand by adopting an international peer review system for the first.

MAIN ACHIEVEMENTS OF THE POLICIES

Developing Human Capital

Through the BK21 project, Korea has encouraged research-focused universities by mainly supporting master's and doctoral students, and new researchers (post-doctorate researchers and part-time professors). The number of graduate students participating in the BK21 project was 36,000 annually, 22.3 percent of all graduate students, and the BK21 project performed a supporting role as a reservoir until new researchers found stable jobs.

The effects of the BK21 project were:

First, through the financial support of master's and doctoral students, it supported financially challenged but talented students. It especially contributed to supplying long term researchers for the country by aiding many master's and doctoral students in the field of applied science and technology. Second, by creating an environment where master's and doctoral students can focus on research, it gave opportunities to increase research capacity. New researchers, master's and doctoral students, did not need to spend their time in other economic activity and could focus on research activity through the BK21 project. The results were reflected in research achievements.

Third, it has had the effect of developing talented personnel with a global awareness by attending international conferences, and exchanges with international scholars. There was also an increase in the number of publications at foreign conferences and a growing awareness of the trends of research in the international scene.

Strengthening Research Competitiveness

The BK21 project invested 59 percent of its whole investment into the field of applied science and technology, 20 percent in basic science and technology, 14

percent in humanities and the social sciences, seven percent on expert services (five percent medical and dental, and two percent management). Also, it invested 80 percent of its entire investment in the top 10 universities to mainly promote universities with a high research capability.

The BK21 project contributed to the expansion of research capacity of graduate schools through expanding the number of master's and doctoral students and researchers at doctoral level. It had a strong effect in inviting master's and doctoral students in basic science and technology, the humanities and the social sciences. In the regional graduate schools, the BK21 project has had the strongest effect. It contributed to the increase of university rankings such that, while four universities in 2005 were in the top 300 of the Times Higher Education and QS World University Rankings, this increased to seven in 2011. It especially had a globalizing effect and solved the chronic difficulty of a lack of students at regional graduate schools by inviting international students.

The BK21 project led to the publishing of excellent papers and findings by supporting new research personnel and graduate students. The growth rate in both the numbers of SCI level papers per person and the Impact Factor (IF) per paper was higher in the project groups in the field of science and technology. Moreover, it contributed to globalization in education conditions at graduate schools by encouraging international full-time staff and students.

Professors earning governmental research support from the BK21 project received three times more funding than that of all universities, and from this stable support an increased research focus rate in turn increased research capability. Additionally, by decreasing the burden of earning for researchers, they contributed to stable research conditions. Where giving scholarship for all graduate students was common practice, it contributed to relieving the competition in secure research and labour costs, which increased the results in basic research by providing an environment in which to focus on research.

The BK21 project strengthened the co-operation between industry and universities to increase industrial research. Industry supported research per person for the BK21 project, which was three times higher than that of all universities, and compared to previous participation in applied science and technology, it had increased by four times between 2009 and 2011. This is more than five times the industrial research support of all university professors.

Increasing the Globalization of Universities

In order to increase the globalization of universities, the government started the WCU project. It wanted to develop human capital by inviting overseas scholars with excellent research records, such as Nobel Prize laureates, to Korean universities, to strengthen the education and research capability of universities, and increase research in the critical are for the future development of the country. As a result, the number of universities in the top 200 rankings of the QS World University Evaluation increased from two in 2007 to six in 2012. They also welcomed 342 international scholars, including nine Nobel Prize laureates.

Through the WCU project, the number of papers published in the SCI's top 10 percent of journals increased by 29 percent, from 1.31 before the WCU project to 1.69 afterwards. Also, the IF SCI level papers increased by 30.2 percent, from 13.6 to 17.7. The amount published by WCU participating graduate students also increased, to 1,150 papers to SCI level journals and 121 (9.5 percent) to other journals. In the area of education, student satisfaction with the establishment of inter-disciplinary majors, and departments and classes by international scholars, increased, and the results of inter-disciplinary studies, foreign language classes, and classes by international scholars increased. It also gave the opportunity to change into a system that develops globally talented individuals through international research-focused universities, operating multiple degree systems.

FUTURE POLICIES AND STRATEGIES

Brain Korea 21 PLUS (BK21 PLUS, 2013-2019)

Background for starting BK21 PLUS. The research capacity and global competitiveness of universities increased through the continuous support of the BK21 and the WCU projects, but qualitative competitiveness was still lacking compared to the qualitative growth in research capacity. It has also been pointed out that there are limitations to developing high quality researchers with a uniform evaluation and support system. Therefore, the Korean government has pushed the BK21 PLUS project, which combines both the BK21 project with the WCU project while fixing the limitations: two billion won will be invested over seven years, from 2013 to 2019.

The Korean government plans the BK21 Plus project to develop "supremely creative individuals at master's and Doctoral level" who will lead the creative economy. The goal is to foster a creative economy through developing and supplying top class creative master's- and doctoral-level human capital, who will lead inter-disciplinary departments, such as the creation of new technology, the humanities and the social sciences, where there is creativity, cultural content, design, etc., by changing from an originally "chase-type" economy to a leading economy.

In order to nurture the world-class universities of the future, education in universities needs to be raised, as well as creativity, and the role of a university as a hub of creativity strengthened. Korean universities have greatly increased quantitatively in education and research capacity up to now, but there have been limits in the development based on creativity, where universities' education and research could connect to the new technology of concerned industries. Therefore, the BK21 PLUS project has as its goal a qualitative leap rather than quantitative growth.

The Goals and Direction of BK21 PLUS. The BK21 Plus project has a goal to grow "creative talented people" at master's and doctoral level, who can bolster a creative economy through increasing research-focused universities and global

capability; the growth of high level experts based on creativity; and the strengthening of education in regional graduate schools, and research capability.

The detailed goals of the BK21 PLUS project are, first, to encourage global research-focused universities; second, to develop high level experts in each area and inter-disciplinary departments; and third, to increase the quality of education and of research in universities so as achieve more papers referenced as having SCI papers, from 30th in 2011 to 20th in 2019.

The next six steps are the basic directions the BK21 PLUS project will take. First, to increase the quality of education and research in graduate schools so as to strengthen the base for research-focused universities, and establishing an administrative system based on quality over quantity.

Second, to strengthen the education and research capacity of regional graduate schools, and to increase the proportion of regional universities supported, strengthening the education, research capacity, and role of regional universities through cooperation with regional industries. The BK21 project and the WCU project invested 24 percent of their resources, but the BK21 PLUS project plans to invest more than 35 percent in regional graduate schools. While the WCU funded project groups where approximately 35 percent were from regional graduate schools, the BK21 PLUS plans to have teams comprising of 45 percent regional graduate schools members.

The third step is to increase the number of individuals with master's degrees and doctorates who have in-the-field experience of co-operation with industry. Fourth, to support the growth of highly-trained inter-disciplinary specialists who will meet social needs, such as digital multimedia, culture, fashion design, travel, and information security, etc. Fifth, to strengthen the project's operation to increase the quality of graduate schools, the project structure will be renewed by 2015, and linked with the plan to reform the quality of graduate schools, which will be announced in the future, with supporting project groups reselected by 2016, while reflecting results and reforms of the two latest years.

Sixth, to create research scholarships for graduate students and support new researchers, increased support will be made available for graduate students and new researchers. This will create an environment for graduate students to focus on education and research without financial concerns. In particular, awards will be increased from 500,000 won to 600,000 thousand won monthly for master's level, from 900,000 won to 1,000,000 won monthly for doctorate level, and from 2,000,000 won to 2.5 million won monthly for new researchers.

There are three processes to the BK21 PLUS project which will continue for seven years, from 2013 to 2019. The first process is the "Developing Global Individual Process." This is a process where the goal is to strengthen research capability by increasing global co-operation between graduate schools around the inter-disciplinary departments. It is hoped to strengthen the education and research capability of universities in critical future development areas at the global level, and it mainly supports the inter-disciplinary areas of research and development to develop an innovative economy.

The second process is the "Developing Specialized Experts Process." This process supports the growth of high-level practical experts in specialized fields. In order to develop high-level practical experts in new, highly profitable, specialized and nationally strategic areas, support is focused on universities who not only on science and technology, and the humanities and social sciences, but also focuses on specialized fields, such as industry, engineering, fashion, design, digital multimedia, culture, travel, information security, and specialized equipment, etc.

The third process is the "Developing Future-Based Creative Individuals Process." This process offers research scholarships to graduate students to develop excellence among graduate students in all study fields. In order to develop the future creative and critical individuals for the study areas, it chooses the project groups and (small) project teams separately.

Moreover, the supporting area for the support group is divided into four. First, the "basic fields" are mathematics, physics, chemistry, biology, geology-related fields. The "applied fields" are Information and Technology (electronics, communication, computer science, etc.), engineering, applied biology (medicine, agriculture and fisheries, veterinary science, applied bio-engineering, etc.), construction, painting, materials, basic medicine, dentistry, and Chinese medicine. The humanities and the social sciences are included in the "humanities fields" and "inter-disciplinary fields."

The Strategies and Policies of Korean WCU

According to an International Institute for Management Development report on world economy rankings, the Korean national economy level steadily increased from 32nd in 2006 to 22nd in 2012. Global competitiveness within Korean education has improved from 42nd in 2006 to 31st in 2012. Korean university competitiveness also increased, from 50th in 2006 to 42nd.

However, Korea has low education competitiveness compared to national competitiveness. Moreover, Korean university competitiveness is lower than its education level. (see Table 6).

Table 6. Korea's competitive world rankings.

Rated Areas	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
Nation	32	29	31	27	23	22	22
Education	42	29	35	36	35	29	31
University	50	40	53	51	46	39	42

Source: IMD (2013).

Before presenting the strategies and policies for reconsidering Korean university competitiveness, we analyse the supporting projects of the world's top universities. We investigate rapidly growing countries, such as China, Japan, India,

and Singapore, rather than examining countries which already have a number of world-class universities.

The university promotion policies in China are Project 211 and Project 985. Project 211 was started by the Chinese government in 1995 and is a project which hopes to create 100 world-class universities in China in preparation for the 21st century. Project 211 has had visible success because it has helped to increase the number of published papers. But there was a limitation because Project 211 distributed a limited budget to 100 different universities. Project 985 started in May 1998, with Peking University and Tsinghua University, and expanded to include 34 further universities.

Policies promoting universities in Japan include the 21st Centre of Excellence (COE), Global COE, and the World Premier Intra-national Research Centre Initiative. The 21st COE programme started in 2002. It focused on inviting world-class scholars, providing student support, and enabling joint research opportunities. The Global COE programme, a follow-up project to the 21st COE, focused on investing in the seven top universities. The World Premier Intra-national Research Centre Initiative, which began in 2007, supported the Research Centre. It was able to encourage a high research capacity and increase the number of research members.

There are 13,000 universities in India. The Government's university policy is focused on Indian Institutes of Technology (ITTs). 16 IITs succeeded in recruiting top class students in 2009. However, there are also limits to creating WCUs, because they do not have enough research capacity.

The National University of Singapore (NUS) in Singapore, a small country, is a typical example of trying to reach WCU status in the short term. The goal of the NUS is to reach world-class education and research from the beginning. In terms of internationalization, more than 20 percent of undergraduates are international students and more than 50 percent on graduate courses. The NUS introduced higher salaries and enough compensation in order to secure faculty of the highest standard. As a result, 80 percent of its professors are from overseas. Although the NUS is a national university, it has strengthened its university autonomy and was incorporated in 2006.

A successful policy direction is to move towards selection and concentration, to have quality rather than the quantity in research, an excellent faculty, and to ensure the autonomy of universities in terms of strategies.

Higher education in Korea has changed, reflecting the stages of economic development. In 1950, higher education was focused on the establishment and operation of the national universities. As higher education in Korea established itself as a universal service, the promotion of South Korea's leading higher education has been classified into three types. The first type is university restructuring. The rapid reduction of college student numbers has led to the consolidation and downsizing of national and private universities. The second type is the selective financial support and empowerment of universities. The third type is selective graduate support programmes, such as the BK21, WCU, and BK21 PLUS projects, which are an important part of a strategy for global

competitiveness, by helping to create a competitive graduate education. The supported target of these projects is not a university population or unit, but a small research population or a valued individual researcher's team.

The BK21 project has established itself by strengthening university research-bases and training excellent follow-up students with stable financial support to graduate students. In particular, it has been valued highly in areas that require collaboration and small project research teams, such as the natural sciences and engineering. Korea's world ranking in Science Citation Index (SCI) publications has continuously improved from 18th in 1999, 13th in 2006 to 11th in 2011. In terms of university international competitiveness, the BK21 project has benefitted universities by launching them into the QS 300, a number that has increased from four in 2005 to seven in 2011. However, it was thought that there are limits to the improvement of quality because of a lack of autonomy in the project's budget and its use of quantitative performance-based methods.

While the WCU project has contributed to Korean education, research, and to the university climate with regards to innovation and global awareness, it had limits in its various internationalization strategies because of the uniform way it attracted the support of foreign scholars. It also had unclear criteria for the level of foreign scholars. In particular, it did not present clear standards for foreign national scholars, Nobel Prize laureates, and the National Academy of Engineering. Moreover, according to the definition of the World Bank, a world-class university is a facility that commonly has a focus of talented individuals, abundant resources, and adequate ordering structure. In detail, it should have a widely-recognized global reputation in education; star researchers in different research fields; strong supporting economic resources; and established histories and traditions.

However, this project was insufficient in creating the conditions that world-class universities should have, as defined by the World Bank. Currently, of the more than 200 Korean universities, less than 10 universities meet such conditions; and with 33 universities participating in the project, the growth of global-level universities is far-off. While the name of the project is "Developing World-Class Universities," participation is in project groups rather than as a whole university, thereby artificially increasing the number of participating universities. It is believed that the competitiveness of Korean universities has continuously increased. Korean universities that had a ranking within the top 500 of the ARWU increased from eight in 2005 to 10 in 2012. In contrast, the number of Chinese universities within the rankings increased from eight to 28, and the number of Japanese universities decreased from 34 to 21. This can be compared to number of European and North American universities keeping their numbers or decreasing in numbers (see Table 7).

Looking at the QS Evaluation between 2008 and 2012, the number of Japanese universities within the top 100 increased from four in 2008 to six in 2012, and the number of Japanese universities in the top 500 decreased from 28 in 2008 to 20 in 2012. During the same period, the number of Chinese universities in the top 100 increased from two to three, while those in the top 500 increased from 12 to 19. In the same period, the number of Korean universities in the top 100 increased from

two to three, and those in the top 500 increased from 10 to 13. However, the number of European and North American universities stayed the same or decreased (see Table 8).

Table 7. Evaluation of ARWU by country.

World	*Country*	*Type*	*The Number of Universities*				
			2008	2009	2010	2011	2012
Asia	Korea	100	2	2	2	3	3
		300	5	5	5	7	8
		500	10	12	13	12	13
	China	100	2	2	2	3	3
		300	7	7	7	8	8
		500	12	11	10	15	19
	Japan	100	4	6	5	6	6
		300	14	13	13	15	14
		500	28	31	25	21	20
Europe	Unitied Kingdom	100	17	18	19	19	18
		300	38	38	39	36	37
		500	50	51	51	51	49
	France	100	2	2	2	2	2
		300	13	13	13	12	11
		500	23	21	21	20	22
	Germany	100	3	4	5	4	4
		300	20	20	22	24	25
		500	43	42	42	40	49
America	USA	100	37	32	31	31	31
		300	75	70	71	70	65
		500	108	104	108	102	99
	Canada	100	5	4	4	4	3
		300	16	16	15	13	14
		500	20	20	20	19	20

Despite the fact that Korean universities have achieved an increasing competitiveness so far, it can be seen that Korean universities are still weak compared with universities in other major countries. According to the QS 2012 World University Rankings, of the top 200 universities, 54 universities were in the US, 30 were in the UK, 11 were in Germany, 10 were in Japan, nine were in Canada, eight were in Australia, seven were in China and in Switzerland, six were in South Korea, five were in Hong Kong, and four were in France.

Table 8. Evaluation of QS Ranking by country.

World	*Country*	*Type*	*The Number of Universities*				
			2008	2009	2010	2011	2012
Asia	Korea	100	2	2	2	3	3
		300	5	5	5	7	8
		500	10	12	13	12	13
	China	100	2	2	2	3	3
		300	7	7	7	8	8
		500	12	11	10	15	19
	Japan	100	4	6	5	6	6
		300	14	13	13	15	14
		500	28	31	25	21	20
Europe	United Kingdom	100	17	18	19	19	18
		300	38	38	39	36	37
		500	50	51	51	51	49
	France	100	2	2	2	2	2
		300	13	13	13	12	11
		500	23	21	21	20	22
	Germany	100	3	4	5	4	4
		300	20	20	22	24	25
		500	43	42	42	40	49
America	USA	100	37	32	31	31	31
		300	75	70	71	70	65
		500	108	104	108	102	99
	Canada	100	5	4	4	4	3
		300	16	16	15	13	14
		500	20	20	20	19	20

Science and engineering colleges in Korea are noteworthy in particular: the Korea Advanced Institute of Science and Technology, 68th in The Times Higher Education World University Rankings 2012-2013, ranked 63rd in the QS 2012 World University Rankings, and ranked 231st in the ARWU, was established by the Korean Government in 1971; Pohang University of Science and Technology, was 50th in the Times Higher Education World University Rankings 2012-2013, 97th in the QS 2012 World University Rankings, and 331st in the ARWU, was founded by the Korean steel enterprise, POSCO. They have made a leap forward globally through short intensive investment, owing to inviting outstanding professors and offering financial support to graduate students. This successful case implies the necessity of a policy that aims to nurture global universities.

The target of the BK21 project, the WCU project, and BK21 PLUS Project is not universities, but small research groups and individual researchers. Therefore, it should be noted that the projects in South Korea is different from those in China and Singapore, which have strategies for developing World-Class Universities by university unit.

The three leading institutions, the Ministry of Education, the Korean Council for University Education (KCUE), and the National Research Foundation of Korea (NRF), play an important role in developing researching capacity and fostering a world-class university. To begin with, the Ministry of Education functions as a supporter that determines the macroscopic principles, secures a budget, and forms a social consensus. Second, KCUE plays a role in understanding the problems in the process of performing and evaluating the plan. It also plays a critical role in implementing a solution and suggesting an alternative, as well as forming a consultation group in order to reflect the voices of universities. Lastly, the NRF is an executive institute. Thus, it is essential to construct a system of collaboration between these three institutions.

KCUE, founded in 1982, consists of 200 four-year-course universities. Its main business is to conduct research on the university education system, student recruiting systems, university curricula, and teaching methods; to evaluate universities; to notify university information; and to strengthen international exchange and cooperation. It also enhances initiatives and public awareness of university operations, and promotes the growth of university education overall.

CONCLUSION

The Korean government is endeavouring to support Korean universities in attaining world-class level, and it is also continues to encourage universities to reach “World-Class University” status. In this study, we present the outcome and limits of the previous BK21 and WCU projects, the representative government projects for promoting universities, and the BK21 PLUS project that is to be carried out.

The efforts made by the Korean government crystallized in the BK21 project, the most representative structure, with a two-level process from 1999 to 2012. A variety of fruitful outcomes, such as the training of talented individuals, was achieved through the BK21 project. Also, there has been an improvement in international competitiveness, including the nurturing of research-focused graduate schools, showing good progress in education, research, and university-industry co-operation.

Moreover, the Korean government implemented the policy that could lead to globalization through the WCU project from 2008 to 2013. As a result, there has been a considerable productive outcome, such as the inviting of overseas researchers, growth in international students, increase in international exchanges, a rise in the actual results of research, a moving up in the rankings, and a raise in the quality of university education.

The BK21 PLUS project, an amalgam of the BK21and WCU projects, to be carried out from 2013 to 2019, will address the problems of the previous projects and qualitative development will be a focus. In particular, the new project will centre upon training talent, strengthening research competitiveness, inducing globalization, reinforcing industry-education cooperation, and improving the quality of education. Also, it will establish and support closer co-operation with relevant organizations at the same time.

Government funding is essential. The Park Geun-Hye administration has publicized that it would increase the budget for higher education from 0.7 percent up to nearly one percent before the end of her term. Daring financial support is needed to nurture "World Class Universities." Furthermore, the plan to foster regional universities is necessary as an aspect of balanced regional development. In this respect, the "Regional University Development Policy" is being carried forward, including greater financial support for regional universities, and the promotion of enrolment-employment-settlement of local talent. Also, encouraging the development of the businesses related to regional universities is being made with the tenets of using targeted legislation.

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7. CONTINUITY AND TRANSFORMATION

Continuous Challenges for World-Class Status among Universities in Taiwan and Japan as Ageing Societies

INTRODUCTION

Over the past decade, the term "world-class," which relates to how a university develops its capacity to compete in the global higher education marketplace, has been widely used. Many scholars have stated that world-class universities should exhibit qualities such as excellence in research and teaching, excellent professors, talented students, academic freedom, favourable governance, adequate facilities, sufficient funding, and an international outlook. Further, they all should be, without exception, research universities (De Maret, 2007; Feng, 2007; Altbach, 2007; Salmi, 2009). Currently, "becoming a member of the exclusive group of world-class universities is not something achieved by self-declaration" (Salmi, 2012, p. 323); instead, international ranking systems determine their status.

Due to global competition, Asian higher education systems, particularly those of Taiwan and Japan, which developed their economies and education systems relatively early, are experiencing new challenges. These include an ageing society, declining public funding, development of new public management models, and an increasing imbalance between the quality and quantity of education. These trends drive higher education institutions to pursue international recognition via initiatives designed to promote excellence. With increased competition between nations, the pursuit of excellence and the establishment of world-class universities are becoming part of the national agenda both in developing and developed Asian countries.

Several "excellence initiatives" have been implemented in an effort to achieve world-class status (Shin, 2009; Marginson, 2010; Neubauer, 2010; Altbach, 2010; Hou et al., 2012). In East Asia, China, Japan, Taiwan, and South Korea have developed excellence initiatives with the aim of developing a number of world-class universities. Driven by the global trend of ranking, Southeast Asian governments, such as those of Malaysia, Singapore, and Vietnam, have announced plans to build world-class universities.

However, East Asian countries and economies are either currently facing the issue of an ageing society (Japan, Taiwan, Singapore, and Korea), or will in the near future (China). According to *Global Age Watch*, the percentage of the population over 60 in 2012 is 31.6 percent in Japan, 19.4 percent in Hong Kong, 16.7 percent in Korea, 15.5 percent in Singapore, 15.4 percent in Taiwan,[1] and 13.3

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 85–101.

percent in Mainland China. In 2013, according to the *CIA Word Fact Book*, the estimated total fertility rates among major East Asian economies is 0.79 in Singapore, 0.83 in Macau, 1.11 in Taiwan, 1.11 in Hong Kong, 1.24 in Korea, 1.39 in Japan, and 1.55 in China.

As front-runners of ageing societies, both Japan and Taiwan are facing the important challenge of building world-class universities which rely heavily on sufficient and high quality human resources. In Japan, the 18-year-old population, a priority group entering higher education under almost universal graduation from secondary education, has already decreased from 2.05 million in 1992 to 1.23 million in 2013, and a continuous further decrease is expected (MEXT School Basic Survey). In Taiwan, according to National Statistics in 2012, the total number of newborn babies was only 0.21 million, compared with 0.27 million enrollments aged 18-24 in 163 universities and colleges. A continuous low birth rate in Taiwan will result in a drastic drop in college enrollment in the next 15 years (Ministry of Education, 2013). It is estimated that there will be a 50 percent drop in the number of high school graduates in 2016, which could lead to the closure of small colleges and teaching colleges.

Furthermore, ageing societies are also facing the difficulty of further economic development, under the conditions of "demographic onus." A decreasing younger population and an increasing older population will lead to a decreasing working age population and decreasing GDP per capita (Ogawa, Kondo, & Matsukura, 2005; Komine & Kabe, 2009). An ageing society, therefore, cannot expect a drastic increase in the total public budget, and the request for public expenditure on education is always challenged by demands for increases in public expenditure on the expenses of an older population, such as medical care and pensions.

An ageing society results in a depletion of both the domestic talent pool and resources, and will significantly hinder the establishment of world-class universities. With smaller cohorts of high school graduates available to enter higher education, even top universities have difficulty in securing students with high academic standards. Hence, universities will either need to improve the quality of educational activities to recruit as many local students as possible, or recruit international students to compensate for the gap caused by the declining enrollment. Singapore, which uses English as an official language, has already revealed a plan to increase its population by attracting talented individuals from outside the country (National Population and Talent Division, 2013). However, most Asian countries face linguistic and geopolitical barriers with regard to the pursuit of such a cosmopolitan university environment.

Challenges for building world-class universities remain in Asian countries. In pursuit of world-class status, a greater investment in research is neither enough nor sustainable, considering the shrinking talent pool of domestic young researchers. For non-English speaking economies, such as Japan, Taiwan, and South Korea, it is necessary to strengthen the ability to foster highly knowledgeable workers, including internationally competitive researchers. Asian institutions aim to compete with their counterparts across the globe through greater internationalization, with measures such as the use of English in course delivery,

publishing research in English, and engaging in cross-border collaborative research.

The main purpose of this chapter is to illustrate the systematic efforts being made by ageing East Asian societies, particularly those of Taiwan and Japan, which have the lowest birth rates in Asia, and the ongoing challenges they face. The higher education policies, strategies, and goals over the past decade that have aimed to build world-class universities for these two economies, and their conceptual framework for continuity and transformation in the upcoming years, will be analysed. The role of the tertiary education systems in Taiwan and Japan will also be discussed.

FUNDING SCHEMES FOR ESTABLISHING WORLD-CLASS UNIVERSITIES

Taiwan and Japan have faced several challenges in maintaining and strengthening their global competitiveness in recent decades (Yonezawa, 2012). Neither possesses abundant natural resources or habitable land and both face the challenge of a low birth rate, partly due to the high private cost of living and education. In these economies, an ageing of society is recognized as a serious threat to the further development of higher education systems, as well as the entire economy. To maintain and improve the global competitiveness of these two economies, it is crucial they invest in the development of highly skilled human resources and advanced science and technology.

Increased competition among the top Asian universities is applying substantial pressure on economies that developed earlier, such as those of Japan and Taiwan. The world's attention is becoming increasingly focused on the emerging higher education systems in Singapore, Mainland China, and India, which have begun to attract resources and talented individuals from all over the world.

Both Japan and Taiwan have accelerated their "selection and concentration" policies with regard to public investment, including investment in higher education, from the beginning of the 21st century. Investment under the principle of selection and concentration – rather than piecemeal or incremental – is a principle used frequently in public administration and business management, and is recognized as rational in the more severe competition of the global age. Simultaneously, especially in case of the ageing societies such as Japan and Taiwan, selection and concentration means the actual reallocation of the resources through the drastic cutting of public expenditure on existing budgetary items.

Japan

In the case of Japan, the traditional approach to public budgeting had been "incrementalism," which aimed to gradually increase the budget each year. Incremental budgeting was more suitable in the age of continuous and stable economic growth and welfare state policies that Japan experienced until the 1970s. Faced with policy change towards neo-liberalism in the 1980s, however, the Japanese government set a budgetary ceiling for prospective operational budgets,

including the higher education sector, and increased project funds that were to be allocated through competition (Asonuma, 2002). Since the 1990s, the government began to increase public investment in science and technology. However, this public budgeting has been mainly implemented as project funds.

In 2001, the then Japanese Minister of Education, Culture, Sports, and Science and Technology (MEXT) revealed her plan to develop approximately 30 universities into world-class institutions. The government provided funds for the projects, known as Centres of Excellence in the 21st Century (2002-2009), Global Centres of Excellence (2007-current), and World Premiere Initiatives (2007-current).

At the same time, the Japanese government incorporated all national universities in 2004, made prospective national universities form six-year plans, and clarified its policy on distributing operational funding according to the performance of prospective national universities. In 2010, the first six-year cycle ended, and budgeting decisions were made based on the result of official performance assessments. However, partly because of the strong concern among universities against the concentration of public expenditure towards the limited number of universities, the differentiation in financial allocation among prospective universities through performance-based budgeting was set at an almost negligible amount.

At the same time, the government set a -1 percent ceiling to the annual revision of the operational budgeting of national universities following their incorporation. This was applied to even the top research universities. The actual income of top universities still increased year by year, but this was based on the active efforts of these universities to increase external income, including public research grants from the Japanese Society for the Promotion of Science. Since 2009, the -1 percent annual budget cut was temporarily sustained through policy change by the change of ruling party.

However, after the tsunami and nuclear accident in eastern Japan in March 2011, the government launched drastic budgetary cuts to the public sector, including national universities, to secure the budget for recovery from these disasters. Many national universities implemented a temporary cutoff for staff salary of up to around 8 percent until March 2014. At the same time, the government applied a budgetary cut in 2013 to reallocate the national university budget (13.8 billion Japanese yen) to 14 projects proposed by national universities to accelerate university reform.

Adding to the excellence initiatives related to research performance, the government has developed funding schemes to support various types of good practices in education activities. These project funds have been distributed rather widely among national, local public, and local private universities.

The increase of the number and types of funding schemes related to excellence initiatives and good practices has made the funding scheme for the Japanese higher education system highly complex. Unlike the California Master Plan for Higher Education in the United States, the Japanese national university system has not introduced clear categories for functional differentiation since World War II. Even

among private and local public universities, some universities claim their academic prestige and high-level research performance as frequently seen among national universities. Combining various types of governmental project funding schemes, the government argues it can enhance the diverse functions of prospective universities. However, when the Democratic Party of Japan was in power from 2009 to 2012, these funding schemes became the targets of budgetary cuts through publicly open spending reviews.

Overall, although the selection and concentration policies have long been considered, it is only recently that the government has accelerated this policy direction. In 2014, Japanese government will start the "Super Global University" scheme that will for 10 years support around 10 universities that can aim to be in the top 100 universities in the world and around 20 universities with global level competitiveness in specific areas. Under increasing budgetary pressure from governmental debt, the selection and concentration policy appears to be the only way to maintain or soften the significant decline of Japanese positioning in the fields of science and technology.

Taiwan

The Taiwanese government has also adopted a selection and concentration policy in recent years. As seen in Japan, Taiwanese public universities were funded by the government and follow a bureaucratic management model. Although private universities rely heavily on tuition, they are still under governmental control for student enrollment, programmes, and faculty recruitment. In 2002, Taiwan's Higher Education Macro Planning Commission (HEMPC), founded by the government, was commissioned to promote excellence within Taiwan's higher education system. To reach this goal, in 2003 HEMPC proposed a national plan to assist a number of selected universities and research centres via concentrated investment. The Ministry of Education launched various types of excellence initiatives with different intended objectives, including three main projects, the Development Plan for World Class Universities and Research Centres of Excellence (2005-2016), the Teaching Excellence Initiative (2005-2014), and the Technological University Paradigms (2013) (Department of Higher Education, 2011).

The Development Plan for World Class Universities and Research Centres of Excellence programme is the leading excellence programme. The first phase, started in 2006, aimed to develop at least one university as one of the world's top 100 universities in five years and at least 15 key departments or cross-campus research centres as the top in Asia in 10 years (Hou, Ince & Chiang, 2012). The second phase (2011-2016) saw a change in the programme's name to Moving into the Top Universities Programme, and continues to aim at building a world-class universities based on the achievements of the first phase. Overall, it sets five specific goals: internationalizing top universities and expanding the global perspectives of students, promoting university research and innovation quality, building the international capacity of faculty and students, strengthening

collaboration between universities and industry, and enhancing graduates' competences in response to social and market demands (Department of Higher Education, 2011).

Generally speaking, in addition to the goal of topping world rankings, recipient universities in the research excellence programme are also expected to "develop more international counterparts, broaden the global outlook of faculty members and students, and better meet the needs of the local industry by turning themselves into an R&D hub that excels in both academic research and practical applications" (Department of Higher Education, 2013, p. 27).

The teaching excellence programme focused more on teaching quality enhancement and curriculum reform, rather than research output. Most importantly, it emphasized that recipients should enhance their learning and teaching infrastructure as well as to develop their internal quality assurance mechanism through intended learning outcomes. The Ministry of Education (MOE) clearly states that "It aims to upgrade the quality of teaching by instructors and learning by students alike" (Ministry of Education, 2013a, p. 1). The programme is moving into the third phase (2013-2016) and paying special attention to strengthening knowledge application in the job market; in other words, universities are encouraged to integrate internship programmes into curriculum design within the credit system and nurture talented students who will be able to support national development. To date, the programme has involved around 30 universities in each phase.

The other excellence initiative, the Technological University Paradigms, aims at assisting vocational education "with cultivating professionals and industry-academic cooperation and innovation R&D squarely at the centre" (Ministry of Education, 2013a, p. 3). The recipients need to focus on industry-academic R&D co-operation through technology transfer. At the same time, they are expected to promote teaching practical skills to increase student implementation capabilities and competitiveness. In addition, the recipients must establish an incubation and innovation centre in accordance to its own distinctive characteristics, which will likely drive the development of Taiwanese local industries.

According to the MOE, 12 research universities, accounting for 7.3 percent of all Taiwanese higher education institutions, were granted support from the Development Plan for World Class Universities and Research Centres of Excellence, with a total of US$330m per year, compared with 31 to 33 teaching excellence recipients being awarded US$53m, and 12 Academia-Industry Collaboration Paradigm institutions with US$34m (Table 1). Over the past nine years, it can be seen that the Taiwanese government allocated the most resources on selected research institutions, with 85 percent of the total budget aimed at building several world-class research universities (Figure 1).

Table 1. Budget allocation of three Taiwan excellence programmes.

Year	*Research*		*Teaching*		*Academic-industry*	
	Budget (million)	No. of institutions	Budget (million)	No. of institutions	Budget (million)	No. of institutions
2005	–	–	25.09	13	–	–
2006	307.43	17(5*)	56.87	28	–	–
2007	307.43	17(5*)	55.52	30	–	–
2008	307.43	15(4*)	54.14	30	–	–
2009	307.43	15(4*)	68.62	31	–	–
2010	307.43	15(4*)			–	–
2011	307.43	12	47.90	31	–	–
2012	307.43	12	47.62	31	–	–
2013	307.43	12	48.42	33	36.28	16(4*)

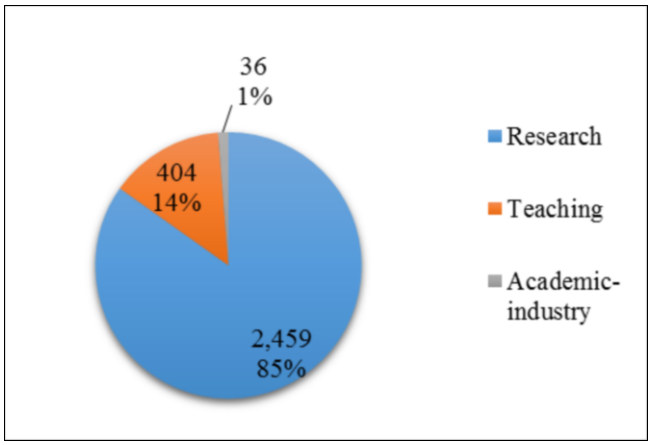

Figure 1. Number and percentage of excellence initiative expenditures by type.

In 2011, President Ma publicly announced two leading internationalization policies to promote the international capacity of Taiwanese higher education, as well as to share its resources with neighbouring countries. There are two national projects: one aims to develop a Taiwanese higher education, the Centre for Higher Education in the Asian and Pacific Region, and the other is to recruit extensively from Southeast Asian nations. Under the two national projects, universities and colleges were encouraged to offer international programmes taught in English and is expected to enrol up to 120,000 international students by 2020 (Welch, 2012).

The Taiwanese government has realized that talent is the foundation to building world-class universities. For Taiwanese higher education to attract more foreign talent, research and teaching recipients must offer at least one programmes taught in English at both the undergraduate and postgraduate level. Research universities, in particular, are encouraged to offer English medium instruction (EMI) programs at the PhD level to attract more foreign scholars.

In 2013, the Taiwanese government initiated the Master Plan of Talent Cultivation, which requires three types of excellence recipients to build core competencies of graduates, as well as to strengthen the collaboration between university and industry (Ministry of Education, 2013b). Driven by the Master Plan, three excellence recipients, from research, teaching or vocational roles, were "called upon to help recruit and cultivate leaders for the future so that Taiwan can be justifiably recognized as a land inhabited by global citizens who have a well-rounded world outlook and the capacity to pursue self-improvement constantly" (Department of Higher Education, 2013, p. 27).

CHALLENGES IN THE FIERCE GLOBAL COMPETITION

Facing fierce competition for global and regional positioning among the top research universities, both Taiwan and Japan are strengthening their policies aimed at promoting excellence within their higher education systems, using more aggressive selection and concentration of public investment, and the pursuit of internationalization. At the same time, the governments and students of both countries are trying to create a more attractive research environment.

Selection and Concentration

Japan is accelerating the actual implementation of selection and concentration policies. In 2012, the MEXT revealed its plan to accelerate university reform. Within that plan, the government requested the redefinition of the mission statement of national universities, first in the field of engineering, education, and medical sciences, and in all remaining fields, to seek possible mergers.

In December 2012, the Liberal Democratic Party and its alliance regained power, and began to accelerate the concentration of public investment towards a limited number of top research universities. The Shinzo Abe cabinet published its policy guideline, the Japan Revitalization Strategy, in June 2013 and declared its vision to have 10 or more Japanese universities ranked within the top 100 universities in the world by 2023. The government set up the Project for Accelerating the Capacity Development of Research Universities (6.4 billion Japanese yen) and selected 22 universities active in world-class research. Beginning in 2014, MEXT will request concentrated budgetary allocation to the top 10 globally competitive comprehensive research universities and 20 universities with competitive fields that can be adapted to globalization (the Super Global University Project: 15.8 billion Japanese yen was requested). The Revitalization Strategy also proposes the idea of further and drastic reallocation of

the operational budget to national universities in 2016, when the third-round six-year goals are expected to be determined.

At the same time, Japan is also recognizing the fierce competition in acquiring talent and the importance of opening up its education and social system to the international community. In 2008, the Japanese government set up a plan, the Global 30 Scheme, to invite 300,000 international students by 2020, and selected 13 top public and private comprehensive universities in 2009 to strengthen their leading roles in internationalization. In 2012, the Japanese government launched an additional support project for internationalization and selected proposals from both comprehensive universities and smaller universities, stressing its intention to send students to study abroad. Under the Revitalization Plan, the Japanese government plan to increase the number of Japanese students studying abroad from 60,000 to 120,000 by 2020.

Taiwan, on one hand, continues to implement a selection and concentration policy; on the other hand, it reviews its accountability. Three Taiwan excellence programmes assisted all recipients by enhancing their international visibility and developing positive academic qualities, and as a result, improved their global rankings (Research, Development and Evaluation Commission, 2010). There are more than 8 Taiwanese universities ranked in the top 500. However, the government, strongly urged by the academic community, has started to review the impact and effectiveness of the selection and concentration policy on Taiwanese higher education, particularly in talent cultivation (Hou, Ince & Chiang, 2012).

Global competitiveness among universities has turned into a complicated issue of balancing the teaching and research missions of an institution in Asian society when college professors still teach many courses (Shin, 2013). Some evidence shows that Taiwan's research excellence recipients did not perform as well as expected in national accreditation, which led to the public's increased apprehension over the teaching quality of the selected research universities. In this sense, Taiwanese selected universities are expected not only to increase their research, but also to improve teaching quality (Hou, Ince & Chiang, 2012). In addition to research performance, research universities are under great pressure to provide students with a good learning environment, like the Teaching and Academia-Industry Collaboration Excellence Programme's recipients (Hou, 2011).

Globally Competitive Salary

Many successful universities demonstrate that "a key success factor in building a top research university is attract, recruit, and retain leading academics" (Salmi, 2011, p. 326). Hence, many Asian universities attempt to attract talent with higher pay, such as in Mainland China, Hong Kong, and Singapore. As established economies, Japan and Taiwan generally provide relatively high salaries for their university academics. However, the traditional salary schemes at universities in Taiwan and Japan appear too rigid to attract the best foreign talent when competing with other Asian countries. Most public and private universities have adopted an

egalitarian and inflexible pay structure without triggering compensation increases or decreases for several decades.

In 2009, the Taiwanese government initiated the Flexible Salary Scheme at Universities, which aims to encourage all excellence recipients to attract foreign scholars, as well as retain local talented professors. However, these excellence recipients did not attract much international talent to teach. In addition to the traditional salary scheme, universities complained that there are still several constraints in the job regulations, the Reviewing Standards and Employment Qualifications for Foreigners Engaging in the Jobs, which prevent foreign academics from teaching in Taiwan. These restraints include no subsidies for national health care and children's education, spouses are forbidden to get a job, among others (Council of Labor, 2013). Until 2012, there were only 1,077 foreign teachers employed in Taiwanese universities; however, this is a slight increase (by 18 teachers) when compared to 2010 (Tamkang University, 2013). Moreover, the Department of Higher Education showed that all excellence recipients recruited 86 international faculty members in 2011, which accounted for 1 percent out of the 7,435 college professors under the Flexible Salary Scheme at Universities project (Ministry of Education, 2013). It is seen that only few institutions benefited from the policy.

In Japan, each national university is allowed to set its own salary scale after incorporation in 2004. Some universities, such as Tohoku University, have already introduced the distinguished salary scale for leading researchers. In case of non-tenure track faculties on fixed-term contracts, the salary scale can be decided in a more flexible way. In 2013, Kyoto University decided to recruit 100 new foreign faculty members (under a contract term) and replace the existing Japanese faculties in the long run. Kyoto's plan aims to provide classes for general education in English, and to recruit beyond the research-only international academics typically seen among top universities in the UK.

However, including prestigious private universities such as Waseda University, the degree of the salary differentiation is still very modest and the strategic recruitment of overseas researchers seen in newly developed Asian neighbours is rare.

Reforms of PhD Programme

The reinforcement of PhD programmes is also a serious challenge for Japanese and Taiwanese top universities in maintaining and improving world-class status. The Times Higher Education introduced a new ranking method in 2010; in this method, the education and research performance of the PhD programme is an important factor for improving ranking status. In the case of societies faced with population decline among the youth, however, this is not an easy challenge.

In Taiwan, the shrinking number of students on PhD programmes is becoming another big challenge in building a world-class university. The pursuit of a doctorate, which does not guarantee a faculty job, does not interest Taiwanese college graduates any more. MOE statistics show that the total number of PhD

students has been gradually dropping, up to 1.4 percent over past five years (see Figure 2).

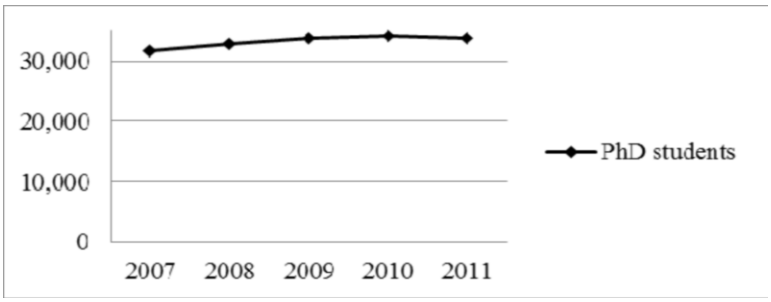

Figure 2. Number of PhD students from 2007 to 2011 in Taiwan.

Up to the present, there are a total number of 809 PhD programmes, with 33,686 students in all Taiwanese universities and colleges. Within this, over 65 percent of PhD students study in research universities, which are the recipients of the excellence project.

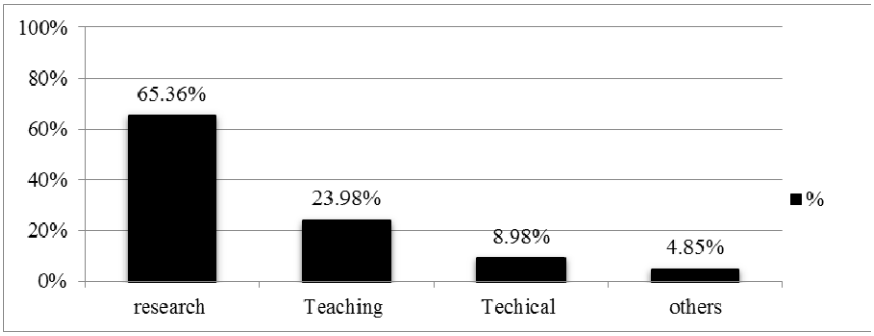

Figure 3. Proportion of PhD students by type of excellence project in Taiwan.

Due to an increasing unemployment rate, college graduates prefer to work immediately rather than get a PhD, which has resulted in a drastic decline in the number of applicants to PhD programmes, and thus, in excellence recipients. At Taiwan National University, the best research university in Taiwan, for example, the number of applicants was 2,361 in 2009, with an acceptance rate of 43.3 percent; but in 2013, this had dropped by 46 percent, with an acceptance rate of 79.5 percent. Moreover, the situation of other excellence recipients is becoming even worse. The total number has dropped by more than 60 percent, with an acceptance rate of 80 percent (Table 2).

Table 2. Number of PhD applicants and enrollment of four Taiwan research universities.

	National Taiwan University		***National Tsinghua University***		***National Cheng Kung University***		***National Chiao Tung University***	
Year	**No. of applicants**	**Enrollment**	**No. of applicants**	**Enrollment**	**No. of applicants**	**Enrollment**	**No. of applicants**	**Enrollment**
2009	2361	1023	954	504	829	368	1347	738
2010	2316	1004	699	492	870	386	1133	661
2011	1948	1009	556	450	607	407	875	631
2012	1630	1009	461	430	483	408	734	605
2013	1269	1009	331	409	363	396	512	579
Decrease rate/ Acceptance rate	-46%	79.5%	-65%	80.9%	-56.2%	91.7%	-61.9%	88.4%

Source: United News (2013). Enrollment in PhD students outnumbers applicants. Retrieved from http://mag.udn.com/mag/edu/storypage.jsp?f_ART_ID=458671.

In Japan, the number of PhD students stopped increasing in the mid-2000s in all academic fields. This is partly due to the pushing factor that the absolute numbers of graduates of undergraduate and master's programmes are not increasing as a result of the decrease in the total youth population. At the same time, the Japanese industrial sector, which has a long tradition of in-house training and job allocation within the internal labour market, prefers younger talent with high potential trainability. In addition, because of the population decline, job opportunities and tenure for faculty members of Japanese universities have become highly limited, especially in the humanities and social sciences. These output factors also make university graduates, even those from top universities, reluctant to pursue a doctoral degree or even a master's degree in these fields.

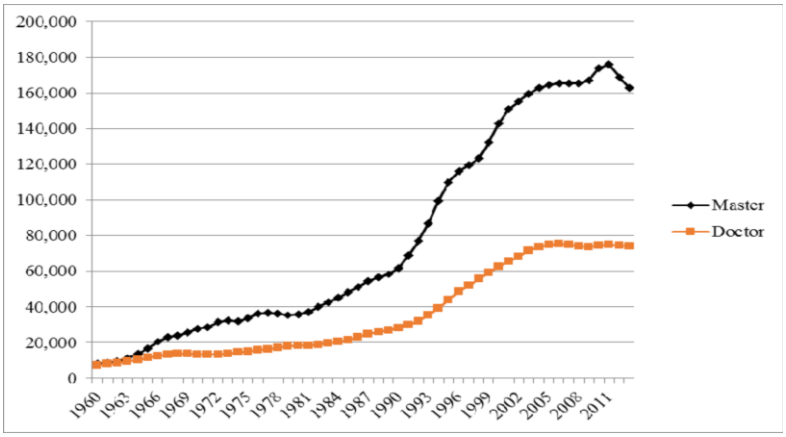

Figure 4. Number of students in master's and doctoral programs in Japan.

RANKINGS AND INTERNATIONALIZATION

Concurrently, there has been widespread discussion of the appropriate use of various assessment instruments, particularly rankings in overall higher education quality and an individual university's performance. Global rankings inevitably causes fiercer competition between Taiwan's universities and triggers tensions and confrontations over the allocation of government resources between those institutions selected and those not selected. It is evident that there is indeed a high correlation between the global ranking of institutions and their government funding. The more funding an institution gains, the higher its global ranking, which makes teaching and vocational institutions worry that a poor global ranking might marginalize them within the Taiwanese higher education.

Yet, the fact that an increasing number of Taiwan universities have been moving into the top 500 in the global rankings demonstrates the efficacy and success of the MOE Research Excellence programme. In this circumstance, more and more of Taiwan's institutions, including teaching and vocational excellence universities, are being encouraged to use the performance indicators of the global rankings as a benchmark to set their institutional long-term goals. Many have changed their institutional policies in some aspects (Hou, 2011). A 2011 survey by the *Research, Development, and Evaluation Commission* (RDEC) showed that 80 percent of excellence recipients are anxious about a negative impact on the trend of homogeneity in Taiwanese higher education (RDEC, 2010).

In case of Japan, the Abe cabinet itself has taken a strong initiative in clarifying its ambition to have 10 Japanese universities within the top 100 in the world. Although the top universities realize that the indicators used by the current world rankings do not necessarily match with their institutional mission, they feel the pressure from both the government and the global market of students, academics, and industries.

From this perspective, an increase in international profiles tends to be recognized as the fastest and most cost effective approach to improve rankings, especially among East Asian countries that are still far behind in internationalization indicators. Here, top universities are not only expected to attract top talent, but also to produce graduates that can work as global professionals. The faculty's international capacity and English medium instruction (EMI) curriculum are two key factors in achieving this goal (Hou, 2013). As higher education becomes global, the "academic staff needs more appropriate competencies and attitudes in an international and culturally diverse environment" (Nellis & Slatter, 2013, p. 71). Faculty members at universities in Asian economies like Taiwan and Japan are encountering the critical issue of offering EMI courses (Byun et al., 2011; Coleman, 2006; Wächter & Maiworm, 2008). However, developing an internationally knowledgeable and active faculty is a critical determinant of success, as Taiwanese and Japanese universities are moving into a more comprehensive phase of internationalization. Therefore, developing faculty intercultural competencies, encouraging them to use English in class, taking multiple perspectives towards curriculum design, and involving themselves in

cross-cultural teaching environments remain big challenges for top universities in both Japan and Taiwan.

CONCLUSION

Japan and Taiwan face challenges related to their ageing societies that have accelerated their world-class university policies, while the resources available for their higher education systems are severely limited. The selection and concentration of public investment has led to an increase in pressure from both inside and outside the higher education systems over the past decade.

Through the policy of selection and concentration, the majority of universities and academic staff face the threat of decreased resource allocation, even if the limited available resources are reallocated to world-class universities and programmes. On one hand, this may lead to strong resistance to the existing rankings and performance indicators, which are incomplete and subjective in nature. On the other hand, journalists, politicians, and governments tend to rely on the results of international university rankings as the easiest way to assess the performance of their public investment in higher education.

Universities are increasingly required to explain their performance more clearly and simply to more diverse range stakeholders, whereas what actually defines a world-class university has become more complicated. In response to these challenges, universities have endeavoured to strengthen relevant communication channels in an effort to encourage deeper understanding of their activities.

However, several issues remain a challenge for Taiwan and Japan as ageing societies, particularly those related to resources, skills, and governance. First, an adequate and sustainable scheme for funding education is crucial to maintaining national strength within a globalized knowledge economy. Second, a clear and effective policy for human resource development via university education is necessary, which raises the demand for internationally competitive faculty members, both in research and education. Third, the role of the national government should be reconsidered with the aim of meeting world-class university requirements for greater institutional autonomy and more financial support. Finally, a system to assure international transparency and accountability is required to attract further investment into their universities from a wider base of both domestic and international stakeholders. Over the past decade, the Taiwanese and Japanese governments have endeavoured to elevate their top universities to world-class status by launching numerous excellence initiatives. Although there has been remarkable progress in both countries, several challenges remain to their continuity and transformation amidst fierce competition for global positioning and wider participation by internationally competitive universities. As Altbach (2010) states, “the struggle is a long-term one and will require not only resources but also the overturning of deeply entrenched academic methodology.” Building world-class universities is necessary if Asia is to continue its impressive economic progress. The importance of human resource development must be stressed in world-class universities if they are to achieve excellent research performance. Sophisticated

research capacity and highly skilled professionals are needed for Asia's future. Taiwan and Japan are two good examples; they both share similar elements with regard to the framework and global trajectory of their higher education systems. Their experiences will likely inspire other Asian nations to implement more adequate world-class university policies in the future.

Table 3. Comparison of excellence programs and challenges in Taiwan and Japan.

Items	*Taiwan*	*Japan*
Types of excellence programme	Development plan for world-class universities and research centres of excellence Teaching excellence initiative Technological university paradigms	Centres of excellence, world premier initiatives Good practice in education and other support for students Super global universities
Purpose of excellence project	Develop several top universities Developing centre for higher education in Asian and Pacific regions	Clarify the mission of prospective universities (including those aiming to be world-class) Make the Japanese higher education system globally competitive
Goal achieved	7 universities in top 500	10 universities in top 100
Shrinking student-aged population	50% drop in the number of high school graduates in 2016	Continuous decline of the 18-year-old population since the beginning of the 1990s
Governance	Rigid salary scheme	Strengthen decision making power of presidents
Talents	Not attracting many international scholars/ decline in number of applicants to PhD programmes	Facing difficulties attracting international scholars and students as a result of increasing competition from Asian neighbours
Resources	Selection and concentration/diversified	Selection and concentration/ diversified, some prestigious private universities seek public funding opportunities
Internationalization	Faculty needs to improve international capacity/offer more EMI courses	Faculty needs to improve international capacity/offer more EMI courses

NOTE

[1] Taiwan's data is derived from the Council for Economic Planning and Development (CEPD).

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8. REFLECTIONS ON THE EFFECTS OF THE 985 PROJECT IN MAINLAND CHINA

INTRODUCTION

Socio-economic transformation and growth in China have led to unprecedented changes in higher education in the last three decades. The notion of a "world-class university" is high on the policy agenda at both government and institutional levels in China. National initiatives to further enhance leading universities' capacity and competitiveness is among the many ideas regarding higher education reform, including the 211 and 985 Projects.

In 1993, China initiated the 211 Project, aimed at developing 100 universities by the early twenty-first century that will take leading positions in the country's economic and social development and international competition. To further enhance public funding for higher education, the 985 Project was launched in 1998, which again reflected the government's goal and efforts to develop a tertiary education system of international standing. With the 211 and 985 Projects, new mechanisms for higher education governance are explored and a path to build world-class universities is developed. After ten years of practice in two phases, the 985 Project has enabled selected institutions to improve their research performance and competitiveness and to narrow the gap with universities already regarded as world-class (Liu et al., 2003). The 985 Project has started its third phase since early 2010. This chapter intends to provide an in-depth account and analysis of the 985 Project and its impact, as well as to explore issues in policies and practices of developing world-class universities in Mainland China.

THE BACKGROUND OF THE 985 PROJECT

Developing the Elite Sector

The idea of developing world-class universities is not a new idea in China. A few of the earliest Chinese universities were established precisely to develop the nation's competitiveness and to promote higher education. Peiyang University (founded in 1895, now Tianjing University), Nanyang public School (founded in 1896, now Shanghai Jiao Tong University), the Imperial University of Peking (founded in 1898, now Peking University), and Tsinghua College (founded in 1911, now Tsinghua University) are among these. The history of national initiatives to support leading universities can also be traced back to the early 1950s, when the Ministry of Education recognized six universities as "key

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 103–114.

universities." Since then, "a system of key universities" has been formed and developed, which has greatly influenced and shaped the higher education structure and its reform in China. The leading universities have been contributing to improving overall quality and playing an instrumental role in meeting the country's demands during the economic transition.

Since the start of China's reform and opening-up in the early 1980s, the government has consistently upheld the basic idea of using science and education in nation-building. The higher education sector has undergone expansion and reform since the 1990s, which has produced a large quantity of highly skilled workers, and to some extent has served the demands of economic development for skilled labour. However, international reports, such as the McKinsey Quarterly and the Global Competitiveness Report 2009-2010, shows that China is still less competitive in terms of knowledge creation and innovation (Lauder, Brown & Ashton, 2008; Schwab, 2009), and requires an overall improvement in the quality of its higher education sector. To further enhance the nation's global competitiveness, the government has adopted a national policy advocating the building of globally prominent universities over the past ten years and has launched a group of specific national initiatives to develop a number of world-class universities, including the 211 Project and the 985 Project.

The 211 Project Waking up Chinese Universities' Awareness of Excellence

Initiated in 1995, the 211 Project aims at developing about 100 universities and a number of key disciplines by the early 21st century. This funding scheme focuses mainly on four aspects of development: disciplinary and interdisciplinary programmes, digital campuses, faculty, and university infrastructure. Compared with other key state projects since the founding of the new China, it was not only the largest scale project in the field of higher education but also the highest level of block grant (Ministry of Education [MOE], 2008). This project clearly indicates that an international advanced level would be the standard, and it aspired to use such a key project to improve the international reputation and status of Chinese universities.

In the first two phases (1996-2000 and 2002-2006), the central government, local governments and selected universities themselves invested altogether 36.83 billion yuan (about US$5.44 billion), of which the central government provided 7.84 billion yuan (about US$1.16 billion). 45 percent of the total financial support was invested in disciplinary development, 29 percent in infrastructure development, 19 percent in digital campus development, and seven percent in faculty development (The 211 Project Coordination Group, 2007). Currently, the 211 Project is in its third phase (2007-present), with 112 universities supported by the project so far.

With the support of the project, the infrastructure and other conditions improved significantly at high-level Chinese universities, markedly enhancing the overall strength of the institutions. More importantly, the 211 Project was a wake-up call to Chinese universities to compete internationally, and has inspired the thinking of

universities on relevant concepts, such as "world-class" and "excellence" (Cheng, 2011). However, there was still a large gap between China's leading universities and their international peers, in terms of faculty, management and governance, and knowledge creation and innovation. Also, due to the large number of universities and research centres supported, the investment received by each individual university was rather limited, which reduced its institutional impact. To more quickly narrow the gap and further enhance public funding for higher education, the government launched the 985 Project in 1998.

IMPACT OF THE 985 PROJECT IN THE FIRST TWO PHASES

Goals and Policy Context

China's 985 Project illustrates the government's goal and efforts to develop a tertiary education system of international standing. The Ministry of Education (MOE) (1998) issued an "Action Plan to Revitalize Education for the 21st Century" and agreed to pursue the 985 Project to establish a number of world-class universities and to develop a number of key research centres of excellence. This project aims to explore new mechanisms for higher education governance, improve the global competitiveness of universities and develop world-class universities with Chinese characteristics. The 985 Project was implemented in two phases (1999-2001 and 2004-2007) and is currently undergoing its third phase (2009-present).

Altogether, 39 universities selected by the government have benefited from this project, with 34 universities selected for Phase I and another five universities added in Phase II. Nine of the 39 universities[1] are top of the list to be developed into world-class universities, and the rest are expected to be developed as world-known universities (i.e. a slightly lower level of achievement but still possessing an international reputation), as stated in the Project policy document (MOE, 2008). It is worthwhile mentioning that these 39 selected universities are only less than two percent of the total higher education institutions in Mainland China.

Implementation and Management

The government plays a dominant role in the organization and management of the Project. The universities participating in the Project are selected by the government. The MOE and Ministry of Finance (MOF) together founded the 985 Project Management Group and the 985 Project Working Group, whose main duty is to discuss, formulate, implement and examine the policies and strategic planning for the Project. In response, the selected universities founded similar groups at institutional level, to coordinate and implement policies and regulations assigned by the central government.

To receive funding, the selected universities submit their project proposals and funding budget plans for review by the MOE and MOF. After the MOE and MOF approve the proposals and budget plans, the selected universities compose a

detailed plan on how the financial support will be spent on each programme annually. Only after passing a further examination of the budget plans by relevant agencies invited by MOF can the universities be granted and receive their funding from the government. The MOE and MOF are also accountable for the examination and evaluation of the selected universities' performance, readjusting the financial support to each university in the following phase according to the evaluation results (MOE, 2008).

Financial Support

The MOE and MOF at the central government level, the local governments of the provinces in which these selected universities are located, and other governmental organizations, collaborate to provide extra financial resources.[2] The total amount of funding received by a selected university depends on different factors, such as the university's position, goals, the status it is expected to achieve in the world system, and the local government's financial situation.[3]

In Phase I, the total financial support for the 34 universities was about 25.5 billion yuan (about US$4 billion), with 54 percent of the funding from the central government. The nine top listed institutions were offered about 42 percent of the total funding. Other than the general goal of creating world-class universities in the "Action Plan to Revitalize Education for the Twenty-First Century," however, the MOE issued no documents concerning the specific objectives and tasks of the first phase, so the selected universities had a significant level of autonomy in implementing the project and allocating funding resources based on their specific situations at each university.

In Phase II, the total funding reached 41 billion yuan (about US$6 billion), with about 46.1 percent from central government. Unlike the more general requirements of Phase I, Phase II of the 985 Project clearly delineated five tasks: reforming institutional governance, upgrading the quality of faculties, building up research platforms, improving infrastructure and promoting international exchanges and cooperation. Most of the funding from the central government (12.9 billion yuan out of 18.9 billion yuan) was spent on building up research platforms, which resulted in the creation of 372 platforms for scientific and technological innovation, as well as philosophical and social scientific innovation. Again, the top nine universities received about 40 percent of the total funding (985 Research Group, 2010). However, with an increased number of the selected universities in Phase II, the average amount of funding for each project was slightly less than that of Phase I.

IMPACT OF THE 985 PROJECT IN THE FIRST TWO PHASES

The 985 Project has enabled those selected institutions to improve their research performance and competitiveness and to narrow the gap with world-class universities (Liu, Liu, Cheng, & Wan, 2003; Deng, Wang, & Liu, 2010).[4] Key national bases for humanities and social sciences research and major national

laboratories have been established to enhance research. The selected universities have played an increasingly critical role both in higher education and in socio-economic reform in China (Liu, 2009). More specifically, the selected universities, particularly the nine top-listed institutions, have greatly improved their positions in the world rankings.[5]

Significantly Improved Selected Institutions' International Competitiveness

Since the implementation of the 985 Project, the selected Chinese research universities have improved their competitiveness, significantly closing the gap with other world-class universities in the world.

A key feature of a world-class university is a high concentration of talent, both in faculty members and students (Salmi, 2009). With their special state funding, the 985 Project universities have implemented various measures to improve faculty quality. In terms of faculty structure, the percentage of faculty holding a doctoral degree in these selected universities has increased from less than 20 percent in 1999 to more than 50 percent in 2008. The percentage of those with doctoral degrees from overseas has grown from 2.7 percent in 1999 to 6.0 percent in 2008. Currently, a group of 985 Project schools require a PhD from overseas as a basic condition of employment for new instructors without work experience. Special policies have been set up to attract a group of elite academics and internationally influential scholars. For example, Tsinghua University brought in the Nobel Prize-winning Professor Chen-Ning Franklin Yang, and the Turing Award winner Professor Andrew Chi-Chih Yao, as full-time faculty.

Meanwhile, these selected universities have played a dominant role in graduate education. More than 50 percent of total doctoral degrees in China are awarded by the 985 Project universities each year. The average number of doctoral students graduating from these universities has increased from 110 in 1998 to 550 in 2007. In terms of student quality, from 1999 to 2008, about 61 percent of the outstanding doctoral theses awarded by the MOE were from the 985 Project universities.

In terms of research output, in 1998, the 39 selected universities produced an average of only 240 papers each that were included in the Science Citation Index (SCIE) and the Social Science Citation Index (SSCI). By 2007, the average number of such papers for the universities participating in the 985 project had reached 1,200. In the same year, the original nine universities supported by the 985 project produced an average of 2,400 papers, exceeding the average output of the UK Russell Group universities and Australia's Group of Eight (both at 2,200), and closing in on the Association of American Universities' 60 member schools, with an average level of 2,800.

The 985 Project universities have improved their quality of education and research and have developed a number of world-class disciplines. Thomson Reuters developed the Essential Science Indicators (ESI) database, which collects papers in 22 disciplines, the world's top one percent in terms of the number of citations. In 2001, 985 Project universities were included in the ESI database in only 40 disciplines but, by the end of 2008, 140 disciplines from 34 of the

participating universities were selected. At the same time, ten 985 Project schools in 26 disciplines reached the top one hundred universities in the world in terms of the total number of citations.

With yearly increases in state investment and special 985 Project funding, the administration expenditures of high-level Chinese universities have gradually gained parity with those of world-class universities. In terms of purchasing power parity, in 2008 the total financial resources of Tsinghua University and Peking University were US$1.57 billion and US$1.28 billion respectively, and their total research expenditure were US$530 million and US$330 million respectively.

Significantly Enhanced Capacity for Scientific and Technological Innovation

The 985 Project universities play a leading role in conducting research and enhancing capacity for scientific and technological innovation.

A primary task of Phase II of the 985 Project was to create technology innovation platforms. The state hoped to build cross-disciplinary platforms that would foster the overall advantages of universities' disciplinary strengths and improve their capacity to commit to, and drive, major research efforts. From 1999 to 2008, the 985 Project universities brought the number of projects under the *National Basic Research Program* (known as the 973 Programme), from the initial ten per year up to more than 30 per year in the last two years. In addition, the 49 technological innovation platforms at Tsinghua University and 21 other 985 Project universities were linked with ten major projects set up by 16 key national universities under the *National Medium- to Long-Term Development Plan for Science and Technology (2006-2020)*, which assumed an important and irreplaceable role in implementing major research projects in China.

In terms of patents, which represent technological innovation capacity, the 985 Project universities produced fewer than 400 patents in 1999, which increased to 6,000 in 2008, more than a ten-fold increase in ten years, and comprising almost one-tenth of all invention patents in China that year.

The State Natural Science Award, State Technological Invention Award and State Scientific and Technological Progress Award represent the highest level of national science and technology innovation in China. During the period 1999-2008, there was a significant increase in the number of times that, and the levels at which, the 985 Project universities received the three awards. Four of the five First Class Awards issued under the State Technological Invention Award (General Projects) between 1999 and 2008 were won by the 985 Project universities.

The Selected 985 Project Universities at the Forefront of Chinese Higher Education

Through the 985 Project, institutions supported by the project have further consolidated and strengthened their dominant position in Chinese higher education. The 39 universities selected by the 985 Project comprise only two percent of all

Chinese universities, but account for nearly half of national totals in terms of various indicators of quality and level.

With regard to development of human resources, the 985 Project institutions have prevailed at the forefront of Chinese universities in terms of quality of resources and conditions for development. The 985 Project Universities have 241 state-level human resources training bases, accounting for 64 percent of the total. The 985 Project universities established 879 – 53 percent – of the country's 1,664 national elite undergraduate courses. Since 1999, China has rapidly expanded graduate education, including increasing the number of doctorates from less than 9,000 in 1999 to over 40,000 in 2007. The 985 Project universities have conferred over 50 percent of all doctorates in China throughout this period, as mentioned previously.

In terms of high-level instructional resources, as of the end of 2008, science and engineering schools at the 985 Project universities employed 85 percent of the science scholars and 60 percent of the engineering scholars working at universities nation-wide. After the introduction of the Changjiang Scholars Award in 1998, distinguished professors and chair professors appointed by the 985 Project universities comprised 80 percent or more of the first nine groups of awardees.

In terms of research output, the 39 institutions under the 985 Project have published about 50 percent of SCIE and SSCI papers annually. The papers published by the original nine 985 universities themselves account for about 50 percent of the total published by 985 Project institutions.

Another indicator of the leading status of 985 Project schools is their tendency to pilot major higher education reforms in China; they also have more administrative autonomy compared to other institutions of higher education. Beginning in 2002, Peking University and six other 985 Project institutions were allowed to independently set up undergraduate disciplines. From 2003 on, 22 schools, comprised mainly of 985 Project institutions, were allowed to independently enroll students. In 2005, Peking University and Tsinghua University were allowed to set up doctoral programmes which do not need state approval.

To promote inter-school cooperation, the original nine universities selected by the 985 Project established the Consortium of China 9 Research Universities (C9) in 2009, and signed a "First-Class University Human Resources Training Cooperation and Exchange Agreement." The agreement includes the exchange of undergraduates and postgraduates for training, mutual recognition of credits, peer assessments of doctoral dissertations, and more (Song, 2009).

REFLECTIONS ON THE IMPACT AND MANAGEMENT OF THE 985 PROJECT IN THE FIRST TWO PHASES

The 985 Project intends to build excellence in teaching and research, and develop the elite sector to lead research and innovation. It has created a culture excellence in some Chinese universities. Despite these impressive achievements, research shows that a gap remains between the 985 Project universities and world-class

universities, and raises issues related to the project's organizational model, as well as issues in governance in general.

A Gap Remaining between 985 Project Institutions and World-Class Universities

Despite the rapid growth in the number of papers published internationally by the 985 Project universities, with the quality of such papers also increasing rapidly as reflected by the number of citations, they still produce very little leading academic research that has a significant international impact. *Nature* and *Science*, two comprehensive scientific journals with very high reputations, have become known for consistently publishing cutting-edge research in various disciplines. There has been no significant increase in the annual number of papers from the 985 Project universities in these two publications over the decade of the 985 Project, demonstrating a continuing gap with world-class universities in this area.

The 985 Project's investment in faculty building has reached several billion yuan; the state has also established the Changjiang Scholars and other special human resources programmes to attract Chinese scholars overseas to return to work in China. A survey indicated, however, that only a small number of the returning scholars' academic reputations are comparable to those of their international counterparts (Zweig, 2006). Of a total of more than 6,000 researchers in the ISI high-cited researcher database,[6] there were more than 100 high-cited scientists each from the world-class universities Harvard and Stanford, while three of the 985 Project universities each had only one highly-cited scientist listed. This indicates that these selected universities still have very few academics with high international influence. In addition, no scholar from Mainland China has yet won any of the most authoritative of the international academic awards, the Nobel Prize or the Fields Medal for mathematics.

There is a common view concerning the gap between the 985 Project universities and world-class universities in terms of achievements by their leading researchers, which holds that China's high-level universities are in the process of moving from accumulating quantity to improving quality and, if the current strategy and input intensity is continued, Peking and Tsinghua Universities should be among the ranks of world-class universities in another 10 years. Some scholars believe, however, that funding is only one of many conditions for building a world-class university; Chinese universities, which lack academic freedom and a conducive external environment, will find it difficult to develop truly world-class universities based on increased funding alone (Ngok & Guo, 2008).

Existing Research Models or Research Culture not Fundamentally Changed

An important task of Phase II of the 985 Project was to break down research organizational models based on the boundaries of traditional disciplines, to set up interdisciplinary research platforms, and to develop effective operational mechanisms to solve major basic science problems and practical issues. Since the existing appraisal system assigned more value to principal investigators, however,

the contribution of other research project participants did not receive proper recognition. Meanwhile, it was extremely difficult to achieve major innovations and, after participants successfully initiated a project platform, it was common for them to divide and subdivide the funding and pursue their own, less risky, research projects. The goal of innovative research organizational models was therefore not truly realized.

In recent years, the overall research funding at 985 Project institutions has grown rapidly, much of it from different government departments for huge research projects. During the decision-making process, officials in charge of these projects have a great influence over of the targets of the funding. Some critics have therefore pointed out that China's scientists are well aware that the projects obtained by a few powerful officials and scientists, using their personal relationships, are deemed to be the most important. This has resulted in researchers investing much of their energy into management and relationships with those in control of the resources, and not on academic work (Shi & Rao, 2010). This unhealthy culture has not only caused a waste of research resources, but has also spawned abnormal academic competition, impeding innovation and the output of high-level research.

The Organization Model of the 985 Project has Produced Some Adverse Effects

The 985 Project is a centralized, outcome-oriented funding programme. The government steers the funding procedures, "cherry-picking" elite institutions where centres of excellence will be established (Salmi, 2009). In terms of organization and management, the 985 Project seems to be a less open, less transparent, with a less competitive mechanism, compared to that of other national initiatives in other countries, such as Centres of Excellence in Japan and the Excellence Initiative in Germany. It is true that the competitive environment within individual institutions has been stimulated throughout the implementation of the 985 Project and universities are increasingly aware of global competition influenced by other external drivers, such as world university rankings (Marginson, 2006; Salmi, 2009). However, the government has organized the funding programme with little transparency in the selection and evaluation processes, with no publicly available clear criteria and requirements. Nor did the 985 Project issue a policy document explaining the amount to be invested in each institution and the basis for it. The choice and funding of the universities was essentially achieved through non-public consultations between the universities and the higher education authorities. Thus, the 985 Project can be regarded as a vertically organized, non-competitive allocation mechanism.

Looking at the results, the 985 Project does indeed encompass a number of China's recognized top universities, but there are some universities that have received support for reasons not related to their academic level. More importantly, due to the absence of an open, competitive process, many institutions at a level comparable to the 985 Project schools (including those receiving support from the project only later), have not had access to such support. The direct result of this

government-led approach, one that lacks openness, is that the universities must focus a great deal on their relationship with the MOE. The MOE's power and control over institutions of higher education has actually increased, which is not conducive to university autonomy over their own management and development.

In addition, the 985 Project has exacerbated an imbalance in the development of universities in China. Having enjoyed a good foundation, these 985 Project universities have naturally formed an elite sector in Chinese higher education. With additional focused investment from these national initiatives, these selected universities have even expanded their edge over other universities, while the majority of China's higher education institutions are forced to second- or third-class status and have lost a fair opportunity to compete. Hence, China's building research capacity and excellence has been criticized as starving the bottom and feeding the top (Altbach & Wang, 2012).

CONCLUSION

The 985 Project is a centralized outcome-oriented funding programme. The government steers the funding procedure, "cherry-picking" elite institutions where research and teaching excellence will be established. Even during the financial crisis of 2008 when governments in the West tended to cut the funding, the Chinese government consistently invested in these national initiatives to develop education and research. Since its implementation, the international competitiveness of the selected universities has significantly improved, their technological innovation capacity has been enhanced, and their leading positions in China's higher education have been further consolidated. However, there is still a gap between these selected 985 Project universities and their international counterparts in terms of research and innovation quality. Research and academic culture has not fundamentally changed.

Bearing these issues in mind, the MOE reiterates the strategic importance of building world-class universities in China, and confirmed it would continue with the implementation of the third phase in 2012 (MOE, 2013). Issues and concerns raised in the first two phases have been tackled and responded to in the third phase. For example, the MOE has more detailed and clearer regulations and policy guidance in terms of the Project's goals, implementation and organization, accountability and responsibilities, funding procedures and evaluation processes. Similar to the goals in the first two phases, the third phase of the Project also focuses on international competition as well as serving for the country's needs, and aims to develop world-class disciplines and research, as well as to enhance the governance model and academic culture in Chinese higher education. The funding duration has been extended from three years to ten years, to ensure a long-term and sustainable funding mechanism. The MOE and MOF invite influential academics and professionals from both China and abroad to form the 985 Project Expert Committee, and work closely with these experts in terms of policy-making and implementation. Also, the MOE and MOF are in charge of procedural evaluations.

The annual funding allocated to each selected universities will also depend on their evaluation results in the previous year (MOE, 2013).

NOTES

[1] The nine universities are Fudan University, Harbin Institute of Technology, Nanjing University, Peking University, Shanghai Jiao Tong University, Tsinghua University, University of Science and Technology of China, Xi'an Jiao Tong University, Zhejiang University.

[2] Only Tsinghua University and Peking University received financial support solely from MOE and MOF. The rest of the 39 universities are funded by both MOE and the local governments or other funding bodies.

[3] Generally speaking, the financial contribution from the central government and local governments are largely equal. However, in relatively developed areas, the expenditure from the local governments is more than that of the central government; and vice versa for those less developed areas.

[4] If not otherwise specified, the statistics in this section are from The 985 Project Report (1999-2008). Beijing: Higher Education Press.

[5] For example, according to the Academic Ranking of World Universities (SJTU, 2010), the number of Chinese universities in the top 300 increased from none in 2000 to seven in 2010; and the number of Chinese universities in the top 500 increased from four to 22.

[6] ISIHighlyCited.com, a database of highly-cited scientists, screened and listed the world's most frequently cited 250-300 researchers in all subject areas.

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SECTION 2

OPPORTUNITIES AND CHALLENGES OF DEVELOPING EXCELLENCE PERSPECTIVE

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9. PRIVATIZATION, THE STATE, AND THE TRANSFORMATION OF WORLD-CLASS RESEARCH UNIVERSITIES

INTRODUCTION

In May of this year, the University of Southern California (USC) succeeded in attracting two prominent neuroscientists from the University of California, Los Angeles (UCLA) (University of Southern California, 2013). Over the last 50 years, academic staff have moved from university to university in the United States quite often. The most common movement occurs at research universities where one or another individual decides for multiple personal or professional reasons that a different institution might be a better institution than the current university. In general, the movement from a public to a private university or vice versa in the United States does not attract very much notice. Until recently, professors moved to an institution because of the adequacy of the research environment and/or the quality of its undergraduate and graduate students, not because one was private or another public.

In some respects, then, the movement to USC, a private university, from UCLA, a public institution, was nothing out of the ordinary. Indeed, because both institutions are in the same city – Los Angeles – such a transfer was quite common. What made the movement different, even extraordinary, is that, along with two eminent scientists, Arthur Toga and Paul Thompson, USC also attracted virtually their entire laboratory of 110 faculty, researchers, and multidisciplinary staff (University of Southern California, 2013).

The focus of the scientists and their lab pertains to the structure and function of the human brain. The neuroimaging lab's movement from UCLA to USC also meant that the $12 million annual budget went from the public institution to the private university (Gordon & Brown, 2013). The rationale for the movement was not simply that Professors Toga and Thompson would get better salaries; indeed, once they decided to move, they did not even seek a counteroffer from UCLA. Rather, the professors commented that private universities are "often a little quicker on their feet" (Gordon & Brown, 2013). Thompson noted how efficient USC was and how easy it was to get things done; by inference, public institutions were not so efficient, and, of consequence, not so effective.

My assumption is that the challenge for public world-class universities, then, is that other such actions will occur and that they will find it increasingly difficult to retain academic staff targeted for recruitment by well-funded private universities, such as Harvard, Stanford, USC, and Duke. As Ron Ehrenberg, an economist, has

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 117–136.

noted, "This is a major problem for public higher education … You can make a really big splash when you pick a field of the future [such as] neuroscience" (Gordon & Brown, 2013). Such movement for USC is fairly typical over the last several years; roughly 30 senior faculty have been hired over the last three years as part of the university's overall campaign to raise $6 billion from private donors by 2018 (Gordon & Brown, 2013). At the same time, the 10 campuses of the University of California's system, of which UCLA is a part, have suffered over $1 billion of budget cuts from the state during the economic recession. A pattern seems to be developing such that USC's success is remarkable, but not unique. UC San Diego, for example, lost three eminent scientists to Rice University, a private institution in Texas, for roughly the same reasons. The alternative – public universities attracting academic staff from private institutions – has not been happening.

Although the challenges are multiple, and many might suggest that they derive from what has come to be known as globalization, I wish to point to two primary problems for public research universities, at least in the United States, that are likely to impact their ability to compete as world-class universities. The first challenge has to do with public funding and the redefinition of the public good; I will consider California as a case example here. The second challenge has to do with what I shall call the "disruptive conditions" of tertiary education. To orient the discussion I will begin with how I think about globalization and conclude with what I think the implications might be for academic work in world-class public institutions.

DEFINING GLOBALIZATION

Globalization is a difficult term to come to grips with, and it is even more so when we consider a country as large and diverse as the United States. A diversified economy and vastly differing cultural and population centres makes generalizations difficult if the discussion is focused on abstractions. Issues of trade and immigration, for example, have been influenced by globalization, but how they have influenced a large urban city such as Los Angeles that is near the Mexican border is quite different from Bozeman, Montana, which is closer to Canada. Accordingly, as opposed to the thoughtful work done by Marginson and Rhoades (2002) that tried to offer a view of globalization that was not anchored in nation-states, I intend to do the opposite here. My assumption is that, to understand globalization, one need not only a framework such as Marginson and Rhoades have supplied, but also examples from a state or region; case examples help make sense of policy decisions. How those decisions get enacted change from nation to nation, and within the United States, state by state (Marginson & Rhoades, 2002). These examples suggest how globalization in the United States is moving states such as California away from the support of public universities and more towards a privatized model that has significant implications for world-class public research universities.

I shall use the term globalization to refer to practices that extend beyond national borders, even though they are frequently enacted in local and national contexts. Globalization has come about and is spread by capital, migration, and, most importantly for my discussion here, technology. The result is greater integration across sectors and countries and an increase in cross-border goods, services, and capital. Because globalization refers to trans-national actions, it is often difficult to see how local practices are impacted. I concur with Gerald Gutek (2006), however, that globalization "as a general process needs to be considered in terms of contextual settings" (p. 100), particularly when we are discussing education. It is the nation-state (and in the United States when we discuss higher education, particularly the state itself) that frames processes and goals.

Education is a useful example of the breadth of globalization insofar as education's reach transcends one or another category: education not only is transformed by globalization, but, as knowledge-producing organizations, schools, colleges, and universities also transform globalization. At one point, the impact of globalization on education was in dispute, but, as Mok (2005) notes, in the 21st century it has become clear how far-reaching globalization's reach is and how much it has impacted education. Discussions often centre around, for example, globalization's impact on economics, trade, or culture. Education cuts across virtually all of these categories. The result is that education, in general, and higher education, in particular, is undergoing significant changes that are as extensive as at any time in the last century. In large part, these changes are due to globalization's demands for knowledge-based economies, and, until recently, the major purveyor of knowledge, at least in the United States, has been the postsecondary institution.

Lester Thurow (2000) has observed that the definition of a country's economy now exceeds simple geographic boundaries. Communication and transportation technologies enable companies to transcend borders in ways unimaginable only a generation ago. The same may be said of tertiary education (Findlay & Tierney, 2010). Where one takes classes and how one takes them and who teaches these classes – indeed, even what we mean by a "class" – is being unalterably changed in remarkably quick ways.

The assumption has been that, in part because of globalization, the United States needs a better educated workforce. If we are to remain competitive, then we need more people participating in higher education; specifically, the Obama administration has called for a million more people a year to be added to higher education in the United States for the next decade (Tierney & Hentschke, 2011). Higher education's "product" gets defined as equipping individuals with the skills necessary to compete in a global economy. Numerous reports, such as those done by McKinsey and Company (2009), highlight that the United States faces an achievement gap in comparison to other industrialized countries, and there will be a severe economic impact if nothing is done. The result is a renewed focus on improving primary and secondary education, increasing participation in tertiary education, and speeding up time-to-degree in colleges and universities.

All of these changes, or talked-about changes, go to the core of how the United States is to define a public good. Until recently, the country has had a quite traditional definition of what we mean by a public good. As Kaul, Grunberg, and Stern (1999) have pointed out, a private good is excludable and rivalrous in consumption, whereas a common good has benefits that are non-excludable and non-rivalrous in consumption. The typical example of a common good is a traffic light or lighthouse. The use by one individual of the traffic light or the lighthouse does not detract from the use by others, and the cost and benefit is similar for all.

We have thought of primary and secondary education as a public good, and, as a public good, the "public" has created organizations where everyone is able to be educated. Until recently, if a parent wanted his or her child to attend a private institution (such as a Catholic school), then the parent received no public support to attend the school, and the parent needed to continue to pay taxes towards the public good. As with other public goods in the United States – national defence, potable water, safety, fire prevention, and the like – the public was the provider through public agencies. If individuals wanted their own security or a private road on private land, then that was within their rights, but they had to pay for it – and they had to pay taxes towards the public good.

Higher education has had a mixed history. Until the late 19th century, the country did not think of higher education as a public good. Attendance at colleges and universities was largely in the domain of those who were wealthy or religious. The wealthy attended private institutions, such as Harvard University or Yale University, and the religious attended the literally hundreds of small tertiary institutions that trained people in a particular religion. The passage of the Morrill Act (1862) during America's Civil War created public higher education for the working class. For the better part of a century, every state had public colleges and universities that were largely free and primarily concentrated on training individuals for professional jobs. The assumption was not that everyone needed to attend a postsecondary institution, but, when people did, they did not need to pay fees. Further, the role of land-grant institutions was to help the largely agricultural sectors of the country improve their output. Again, if a student wanted to attend a private institution, he or she could. Even with federal support, though, the assumption was that the tuition (fees) was the responsibility of the individual.

A central derivative of globalization has been a rethinking of what we mean by a public good. This redefinition cuts across many areas, but also includes education. The consequence has been circular. Dissatisfaction with inadequate police protection, for example, has led to the rise of private security firms that the individual has paid for, which has made the individual less willing to support taxes for public security. The assumption that traditional public goods (i.e. national parks, museums, and civic events) should be supported by the taxpayer has been replaced by fees for service and a need to raise money from private philanthropy. Public television receives a fraction of what it once received from the federal government as private companies have risen on cable, the internet, and other outlets. On the one hand, individuals argue that technology has made what is offered on public television superfluous, and, on the other, is the argument that

taxpayers should not support services that are also offered in the private sector. With regard to education, individuals are able to attend a variety of schools that may not be "public" but instead are charter schools. Although the assumption in education is still that education is a public good, rather than an organization -public schools – we now fund individuals to go wherever they desire.

The result in higher education has been a movement in the same direction. Public higher education has slowly been defunded at the state level, and those private institutions which are known as for-profits have increased in number. Rather than fund the organization – public colleges and universities – the trend has been towards trying to fund "consumers" (the students). At the same time, rather than have the public pay for the cost of higher education, greater responsibility for the cost has switched to the consumer. All of this has occurred at a faster pace, not simply because of technological changes, but also because of the ideology of capitalism that is at globalization's core (Slaughter & Rhoades, 2004). The driving assumption is that the organization needs to be more efficient and productive.

I have previously written about how the first wave of globalization was simply the movement of students across borders. The number of students in Asia, for example, who moved overseas for their university education almost doubled between 1999 and 2006 (Tierney & Findlay, 2008). To be sure, such increases will continue. The new wave of globalization, however, includes not merely teachers on the move, but also programmes, degrees, and institutions. And "movement" is not simply geographic travel, but, as I discuss below, also participation enabled by improvements in technology and communication. The underlying ethos is one of competition; the World Trade Organization has estimated that the global market for education is well over $30 billion. The Organization for Economic Cooperation and Development (OECD) estimates that there are now over 150 million students in tertiary education – a number that has doubled in 10 years (Tierney, 2011).

THE STATE AND PUBLIC HIGHER EDUCATION

A state's role in higher education has been relatively straightforward until recently; the states had different kinds of public institutions for different kinds of students. All states in the United States have three tiers of higher education institutions: community colleges, colleges/universities, and elite research universities. We also have seen institutional isomorphism occur throughout the 20th century such that a state teacher's college became a state college and then a state university and then a research university. Two-year community colleges eventually offered four-year degrees, and the like. One challenge of the 20th century was to differentiate the different sectors so that all institutions were not similar; at the same time, given that the institutions frequently catered to local clientele, there was a push for institutions to offer a full array of courses and degrees.

The primary job of these institutions has been to educate individuals, and that has been defined by the attainment of a degree. The idea of education as a socializing agent, or as a way to instill civic values in individuals, has largely been overlooked for at least a generation. Community colleges always have offered

certificates for working-class jobs (e.g. plumbing), but they also frequently have been criticized because of their high drop-out and non-completion rates, as well as their low transfer rates to four-year institutions. The second-tier state universities also have offered master's degrees, and the research universities have focused on graduate education. Most states also have had a medical complex devoted to the training of physicians; a teaching hospital and medical complex also has contributed to the health and economic welfare of a state. Research, as an economic engine for a state, has varied significantly. Many states, like California, are particularly concerned about research, while other states, such as Mississippi, show a virtual disregard for university-based research.

Although variations have occurred across states, the general principal throughout most of the 20th century was that the state funded public institutions, and a relatively small portion of a postsecondary institution's budget was dependent upon tuition or other revenue. Trends also existed by sector; virtually all of a community college's and state university's budget derived from state support, whereas the elite public research universities have a history of attracting federal research dollars, primarily for science, and foundation support for a variety of research areas.

Over the last generation, public institutions also have become involved in capital campaigns, similar to those at private universities, in order to generate revenue from alumni and wealthy philanthropists. It is important to remember, however, that even in 1990 a majority of public research universities had never embarked on a capital campaign. When Pennsylvania State University announced at that time that it was going to have a $100 million capital campaign, it was the largest such campaign ever done by a public institution; today, such a campaign would be thought of as trivial. Thus, the sorts of activities that occur today are relatively new and are the result of reduced revenue on the part of the state and increased demand for services by the university. The assumption has been, however, that if public research universities are to maintain their status as world-class institutions, then they must raise revenue from private sources insofar as the state will no longer provide enough support.

Inequality and Access

Although public higher education has, in large part, existed to aid those who could not afford private universities, an overt emphasis on lessening inequality and increasing access to higher education has not always been a specific force for public policy. For much of the first half of the 20th century, public higher education officials had a laissez-faire attitude toward using public colleges and universities as a vehicle for overcoming economic inequality. And in some states, especially in the south, there was an overt emphasis on keeping African American students out of college. In general, however, the assumption was that if students found their way to campus, then they were educated. Those that did not make it to campus were not educated. The responsibility for applying to college largely rested

with the individual, and it was not the obligation of the state or institution to help the individual get to university.

Eventually, the approach to who should go to college and whose responsibility it was to help people prepare for and apply to college changed. Although higher education was not yet seen as imperative, enough studies were done that pointed out the benefits of a well-educated workforce and the unfair advantages that existed for the economically advantaged. As a result, the state directed public institutions to take a more proactive stance toward inclusion. The GI Bill increased the participation of veterans returning from World War Two, for example, and a variety of federal and state initiatives have occurred since the 1960s. Affirmative action, a policy designed to increase the representation of people of colour in higher education, had some success in enabling more faculty and students of colour to be represented.

The strategy taken with most initiatives frequently was to make the benefit available to everyone. Financial policies, tuition benefits, and the like, were available to all citizens and not simply to those who needed them. Thus, even though some private and public universities offered equivalent curricula with equally qualified faculty, tuition at the public institutions was dramatically discounted not only for those who were unable to pay full tuition, but for the middle and upper classes as well. Again, the philosophy had been that, as a public good, the cost to the citizen was the same, regardless of income or location, just as the cost of clean drinking water or protection from unsanitary conditions was the same.

Affirmative action was the exception to the rule. The underlying assumption of affirmative action was that a public good existed – higher education – that not all individuals could make use of in large part because students of colour were under-prepared. From the 1960s until the end of the 20th century, this policy was sharply debated by those who felt it provided an unfair advantage for students of colour, even though African Americans and Latinos were significantly under-represented in higher education. By the beginning of the 21st century, the policy had largely been gutted in most states (such as Michigan) and eliminated in others (such as California). Although sharp discrepancies remained in college participation and graduation rates between the poor and the wealthy and amongst African American, Latino, Anglo, and Asian American students at the end of the 20th century, it is also true that significant participation and graduation increases had occurred especially over the last half century.

Privatization

The shift from the idea that an organization should be the provider of a public good has opened the door to a significant increase in private providers and the privatization of public institutions. Indeed, even a movement toward privatization of public universities has been tepid, at best.

Currently, the fastest growing sector in higher education in the United States is for-profit colleges and universities (FPCUs) (Tierney & Hentschke, 2007).

Although FPCUs have existed for over a century in the United States, until recently they were relatively small companies that offered one specific skill or trade, such as cosmetology or welding. However, the largest institution in the United States is now the for-profit University of Phoenix. These institutions all have a similar funding model. They outsource the vast majority of their services (such as admissions) and standardize their curricula, teaching, and learning across campuses. Courses are offered in areas that are convenient to students, such as shopping malls, and the courses are offered at convenient times for the working adult – evenings and weekends. Faculty are part-time; in general, they do not receive health or retirement benefits, and they will be dismissed if there is a drop in enrollment in the classes that they teach or if their teaching evaluations are not excellent.

FPCUs rely largely on their ability to fill out paperwork for a student to apply for grants and loans from the federal and state governments. The result is that over 90 percent of the institution's income is generated from fee-paying students, and the students' fees derive from the government. Ironically, then, the most private of our institutions thrive, and most likely could not survive, without public funding. The difference, of course, is that these private, for-profit companies pay taxes to the government, and generate revenue for the owners or corporate boards. Students also graduate with greater debt loads than at comparable public and private non-profit institutions, the retention and graduation rates tend to be lower than at comparable institutions, and default rates on loans have been a significant issue.

The argument for for-profits has been made succinctly by Weisbrod, Ballou, and Asch (2008): "Services that can be sold profitably do not need public subsidies" (p.4). From this perspective, education, as defined as preparation for the job market, is a good that can be sold, and a for-profit college can do it as well as, or better, than a publicly-subsidized institution. The alternative argument, of course, is that education is more than vocational training and that the purpose of a public university is more than simply the selling of a service.

There is a vigorous debate about whether public institutions are receiving less revenue from the state government, or if these institutions are growing in areas that are irrelevant to the state, making it appear that the institution is receiving significantly-less revenue when actually they are receiving stable funding for core activities. Regardless, whereas public institutions, at one point, relied almost entirely on the state government for their revenues, these same institutions now have diversified revenue streams: the state, donors, and philanthropy; research grants from federal, state, local governments, and foundations; extramural activities; and tuition. Some public institutions receive less than 25 percent of their operating expenses from the state government. Occasionally, a governor of a state or a president of a public institution has floated the idea of letting these institutions become entirely private, but no one has yet acted on the idea. More commonly, a state has allowed a public institution to set its own tuition rates, purchase items without going through the state bureaucracy, or receive funds outside of the state system.

Nevertheless, the public landscape is significantly different at the end of the first decade of the 21st century than it was a half century ago. Privatization also has had an impact on the working conditions of the institutions. The United States now hires more non-tenure-track faculty than tenure-track; part-time faculty are more common in many institutions than full-time (tenure-track or non-tenure-track) faculty. Because public institutions still relied on a part of their revenue from the state when the economic crisis of 2008-2009 erupted, public institutions had more significant problems than private, non-profit institutions and especially for-profit colleges and universities. Many faculty at public institutions were furloughed, as were public employees, which resulted in a loss in many states of about 10 percent of a professor's salary. The result is that private, non-profit research institutions seem to be eclipsing public research universities.

Certainly, private institutions had similar problems; however, because their losses were largely restricted to endowment income, they did not face a crisis with regard to their operating revenue. Because for-profit institutions have a low set cost for personnel, they were not impacted. None of the institutions faced a decrease in applicants; the result was that those institutions that relied on tuition revenue – for-profit and private non-profits – did better than those institutions that still existed in part through public funding. As I shall discuss, because of the loss of operating revenue, public institutions are now considering downsizing their enrollment, whereas for-profits are gearing up for growth.

A consequence of privatization is greater managerial power and decision-making authority. Although private universities also function under the academic model of shared governance, it is fair to say that the diminution of the "public" nature of an institution increases the voice of administrators and decreases that of the academic staff. As Douglass (2009) has observed, the consequences of globalization are "broader authority for university presidents, including greater authority in budget management and administrative authority" (p. 9). Democratic principles of decision-making are not so much eschewed or repudiated, but simply overlooked in the rush to make decisions so that the organization is more efficient.

Regulation

One might think that a decrease in funding makes a public institution less dependent on state demands, but, as state funding has decreased as an absolute percentage of overall revenue, state regulatory control has increased. Until recently, the state had been relatively uninvolved in the regulation of postsecondary institutions. Regulation had been ceded to accrediting bodies – both institutional and professional. What a college or university offered and how quality was defined had been granted to the institution, in general, and the faculty, in particular. Regional accreditation, although critically important, simply demonstrated minimal levels of institutional competence. Without accreditation, an institution's degree was relatively worthless, although many institutions, especially for-profit institutions, have existed without it. The lack of accreditation, however, meant that the students could not receive federal or state loans and grants, and that

if they wished to transfer to another institution, their degree and institutional credits would not be accepted.

Although state legislatures always have taken on "hot-button" curricular issues from time to time, in general the state has stayed away from regulatory control. Presidents created budget requests, and the legislature approved all or some portion of it. Line item vetoes, or oversight on a particular course offering was generally not done. To be sure, at times special requests occurred. The state may have decided that a particular focus was important, or a legislator simply wanted some particular centre or institute at the postsecondary institution in his or her political district, but the overarching assumption was that the postsecondary institutions knew best how to lead their institutions.

Over the last generation, that assumption has gradually changed. Accreditation has come under attack as being too weak and too slow, and technological changes have challenged geographically-based accrediting agencies. If a public, private, or for-profit institution is based in Nebraska, but has an online master's degree that students in New York are taking, from which region of the country should the degree be given accreditation? If someone wants to be a veterinarian, is it more important for the institution to have accreditation from a state agency, or one with broader reach, possibly beyond national borders? As Duderstadt and Womack (2003) have pointed out, "Higher education is breaking loose from the moorings of physical campuses, even as its credentialing monopoly begins to erode" (p. 76). The result is that, on the one hand, we are seeing the market replace regulatory control, while, on the other, the state is asking for greater oversight of those diminishing public dollars that they provide.

Higher education, then, is evolving like other deregulated industries, such as healthcare, where we see public and profit-making hospitals; we also experience all the strengths and weaknesses of the market and deregulation such as we have recently experienced in the banking and housing industries. The general winner of deregulation is for-profit companies who have viewed accrediting bodies as exclusionary gatekeepers. Critics charge, however, that the state is adding regulatory burdens to public institutions precisely at the time they are weakening their oversight capacity of other institutions. As a result, the consumer is put at risk.

The shift away from the creation, sustenance, and support of a public good reflects shifts with other goods and services for the state such that the state no longer sees itself as a purveyor of public goods. A consistent and radical line of thinking is that the state and federal government's regulatory role should also be negligible. The subprime mortgage loans that contributed to the housing crisis in the United States reflect a philosophy that says markets need to be unregulated for capitalism to flourish. FPCUs have made the same sort of argument, and have largely succeeded. They would argue, as most proponents of such arguments reason, that there is still too much regulation. Their argument is that if problems exist, they will fix the problems, and they do not need regulation to hamper their efforts. The consumer (the student) only buys "good" products, so it is in the organization's interest to police the quality of the product. Although there is some

admitted truth to such an assertion, it also does not take into account a history of malfeasance by companies that have shown little regard or concern for the customer.

Ironically, public institutions have faced a twofold problem. They have been criticized as the opposite of consumer-friendly. Because they presumably receive a steady stream of revenue that is impervious to consumer demands, the argument has been made that they are out-of-touch and exist to support the academic staff, rather than the students. Because of this perception, steps have been made to regulate them and to make demands with regard to admissions, retention, graduation, time-to-degree, and a host of other issues.

Knowledge-Based Economies and Research

The approach of the United States to research is odd insofar as the majority of the revenue derives from federal agencies – the National Institutes of Health, the National Science Foundation, and the like – but those agencies distribute monies to state agencies or to institutions located in states. Some states have been more aggressive in creating a research policy for the state (e.g. Texas) whereas other state efforts have been negligible (e.g. North Dakota). Because of the economic downturn, states and cities also have adopted what, to some, is a short-sighted approach where either they can reduce revenue to public research universities (e.g. Arizona) when all budgets need to be cut, or they have considered taxing postsecondary institutions (e.g. Pittsburg).

One of the dilemmas of American research policy is that it is state-based and generally institution-based. Research goes hand-in-hand with the concomitant activities of any university – teaching and learning, outreach, and the like. Thus, states rarely decide issues of research need without related discussions about upsizing or downsizing their postsecondary systems. The creation of more community colleges, for example, may serve the needs of a local community with regard to serving additional students, but the decision has nothing to do with the state's research capacity. Similarly, adding a state university may increase the bachelor's degree production of the state, but such a university will have little direct impact on the research infrastructure of the state.

The addition of a research university presumably should have something to do with an increased research capacity; more often than not, however, such an addition has to do with creating another elite institution for a state where full-time traditionally-aged students may attend. Because research universities have doctoral education, and other institutions do not, they are generally more expensive to staff. Academic staff members teach less than their colleagues at state universities and community colleges, classes are smaller, and more monies go to support a research infrastructure. Although a state may be well-advised to increase the number of research universities that exist, or to enable a state university to become a research university, such decisions generally have little to do with any decision about whether the state's research infrastructure is adequate to meet the needs for the state's strategic plans.

California and the State of Globalization

Throughout much of the 20th century, California was looked on as the state with the best higher education system in the country. Its research universities, especially UC Berkeley and UC Los Angeles, were thought of as among the best postsecondary institutions in the world. The California State University system served more students and produced more bachelor's degrees than any other state system in the country. The community college system was elaborate and served all potential students throughout the state so that anyone had geographic access to higher education. California had private universities that were consistently ranked in the top 100 – Stanford University, California Institute of Technology, the University of Southern California. The state also had more universities than any other state which were members of the AAU (American Association of Universities) – the country's elite association of premier research institutions. California also had many small elite liberal arts colleges with storied traditions – the so-called Claremont Colleges.

Because of the elaborated postsecondary system, a state government that viewed research as part of an economic engine, and the wealth and size of the state, California received a significant amount of research funding from the federal government and foundations. Silicon Valley succeeded, in part, because of its proximity to postsecondary institutions, most importantly, Stanford University – a private institution. Perhaps what is most remarkable in all of this is that the state rose to eminence in a relatively short time period. Few postsecondary institutions existed in the 1880s, and not until after World War II could the state begin to boast of a successful system of colleges and universities.

Most point to the state's Master Plan for Higher Education as the progenitor of excellence (California State Department of Education, 1960). The Master Plan is a half century old and focused exclusively on access to higher education for the state's citizens. The assumption was that an educated citizenry benefited the state and, regardless of income, individuals should be allowed to gain a postsecondary degree in one of the three state systems – community college, state university, or research university. The Master Plan made no comment on the state's need for a research infrastructure or the role of private colleges and universities, much less that of for-profit institutions.

Although the Master Plan clearly had shortcomings, the assumptions in it were clear, and it worked relatively well up until the last decade. Universities have been bound by size constraints, however, and as the state's population grew, the system struggled with how to expand. Although explicit forms of discrimination did not exist, the poor and minority communities had a much higher participation rate in community colleges than in the system's best institutions. Sustained and systemic transfer from the community colleges to four-year institutions never succeeded. By the start of the 21st century, a much higher percentage of high school students aspired to go to college than had in 1960. Working adults also wanted additional educational services, but they were also less prepared than their predecessors. For-profit higher education became the fastest growing sector in the state, but its

growth was largely ignored by the legislature – both to help alleviate the over-crowding in the public system and to regulate alleged practices that short-changed the consumer.

How the state responded to the enrollment crisis, however, was to build more campuses. The creation of new campuses occurred not only in growth areas, but also in locations that met the needs of the state's politicians, rather than those of higher education. Nevertheless, the assumption remained that the obligation of the state was to continue to provide a public good to the citizenry, and the manner in which that good was to be delivered was via a public organization. Although tuition had been implemented by a verbal sleight of hand known as "fees," the cost of attending a public postsecondary institution was among the lowest in the country. Private non-profit and for-profit institutions were able to set their costs to whatever the market allowed, but public institutions provided below-market cost and the state subsidized the costs of the institution.

Research, as a postsecondary function, remained important, if not more so, but the focus had less to do with research policy than with political and fiscal imperatives. That is, the state created a new research university, but it placed the institution in a remote part of the state to meet political needs, rather than to enhance the state's research capacity. As state funding slowed, the importance of attracting external funding via research also increased. Whether the state actually needed to increase its research capacity was divorced from how the postsecondary system responded to the more pressing needs of enrollment expansion and fiscal contraction.

Although some of what I have outlined above remains as a state obligation, what we are currently experiencing in California is something new, and I attribute it to the impact of globalization as an economic, cultural, and social force. The state has moved away from the assumption that it is the state's obligation to fund postsecondary institutions and instead is moving towards funding individuals in much the way that they are doing in primary and secondary education. The result is that, through a confluence of forces, the state has significantly increased the cost of higher education – approximately 242 percent[1] for the UC and 211 percent for the CSU between the 2001-02 and 2011-12 academic years (Pickoff-White, 2012).

Academic staff have made minimal use of technology to radically alter their style of teaching. The manner in which an individual conducts his or her research has been significantly impacted by technology, yet professors teach their classes in much the same manner as a decade ago, even though class size has increased. Classes begin and end according to an academic calendar. Summer is still a time for students and staff to leave the campus. Courses are more similar in their temporal nature than different, and graduation continues to revolve around the accumulation of credits. In short, the public postsecondary system has not adapted to technological changes that the consumer increasingly desires.

Private research universities, such as the University of Southern California or Stanford University, are flourishing. Although small liberal arts colleges face significant economic hurdles, and for-profit institutions have come under withering

scrutiny by Congress, those private institutions that are world-class continue to do quite well and outcompete their public school counterparts.

In large part, the state still maintains an ideology that higher education should be available for its citizens, but the underlying philosophy is that the state's role is not to provide those organizations but instead to assure that a panoply of types of organizations exist in the marketplace. Rather than an organization as a public good, we now have that public good functioning within a market by private providers, and the role of the state is to enable the consumer with some sort of funding, and to regulate those providers in some fashion.

Those who have been most upset with this shift are not the consumer but the providers – academic staff and the administrations of the public universities. Public employees have seen their wages decrease and their numbers decline. Pension plans, once thought of as untouchable, are likely to come under increased scrutiny. Insofar as healthcare is not mandatory for temporary staff and casual workers, the costs for healthcare are increasingly shifted from the organization to the individual. Many divisions and departments of the universities have felt increasing pressure to pay for the unit's employees; department chairs try to endow their departments by way of gifts from wealthy donors. Basic services, such as telephones and janitorial services, have been eliminated or dramatically cut back at public universities. Class sizes have increased, and some classes have been eliminated.

The largest concerns with privatization are that the university is becoming a glorified trade school where business programmes, computer science degrees, and the like attract external support at the expense of the humanities and poorer professional schools. Further, when donors "buy" departments through naming rights, there is also a concern that academic freedom has been compromised. The ability of the university to be a critic of social practices and societies becomes compromised when academic survival depends upon those who will bankroll the organization.

One may reasonably ask if all of these changes are because of globalization. Because the term is so porous, and multiple actions get attributed to it, cannot everything fall under its umbrella? Such a question is certainly fair, but consider for a moment if the opposite trends were occurring. Assume, for example, the following was happening in California: tuition was still non-existent and the state paid all costs for an elaborate public postsecondary system. The regional accrediting association acted in a manner to keep for-profit providers from entering. The purpose of a degree was as much concerned with enhancing citizenship and the love of learning as preparation for the workforce. Academic staff taught classes at a time and format that was standardized, and students took four years to gain a degree.

Such a sketch is from another time in history and seems outdated today. Although we might claim that such a portrait is what should happen, it is impossible to envision, in large part, because of globalization's philosophical and practical force. If the state simply took in the same percentage of sales revenue that it made in 1968, we would not have a deficit and would be able to fund higher education. Why have the state's sales revenues plunged? It is not because we are

selling fewer goods, but rather that consumers are free to buy products and service over the internet and pay no sales tax. In the United States if an individual buys a book online, for example, he or she pays no sales tax; if the consumer bought that book in a Los Angeles bookstore, he or she would pay a 10 percent sales tax. The result is that consumers have fled local businesses in favour of online shopping. Further, since 1994, the citizens, spurred on by conservative politicians, have repealed tax after tax; the primary beneficiary has been the wealthy. If we still had every tax in place that we had in 1994, we would be able to balance the budget and envision a different postsecondary system.

Similarly, as I discuss below, if technology had not made learning possible in radically different formats and modalities, then staple pedagogies might have sufficed. But globalization has speeded up the temporal nature of learning and enabled students to learn in manifold manners and not simply by way of a seat in a classroom. The impact of free-trade agreements on the United States, in general, and California, in particular, is that a vocational trade, or simply a high school degree, will no longer suffice to ensure a livable wage. The state also has to import workers from other countries (primarily China and India) and other states to fill professional jobs in science and engineering. The result is that higher education is a growth industry. The public system no longer can be the sole primary provider, and, in its stead, will be a largely privatized system with multiple providers. I turn now to the genesis of these multiple providers and then consider the implications for public, world-class universities.

ANALYZING THE DISRUPTIVE CONDITIONS OF TERTIARY EDUCATION

Traditional organizations, whether they are profit-making companies or non-profit institutions, such as colleges and universities, generally try to adapt to the times and meet the needs of their customers. They do so by calling upon what Clayton Christensen and colleagues have defined as “sustainable technology” (Christensen, Horn, Caldera & Soares, 2011). A sustainable technology improves upon the current technology that exists in a traditional organization. The clearest example of a sustainable technology is when typewriter companies moved from manual to electric typewriters. Anyone who can remember the days of manual typewriters will remember the excitement of the adoption of the electric typewriter. What we were doing suddenly got easier and faster. On a less dramatic level, the change from having to use the miniature “whiteout” or correction fluid to change a typing mistake to being able to use the small sheets of paper was also a sustainable technology that brought about improvement to an existing technology.

A sustainable technology improves performance for the existing market, and conceivably brings in additional customers who may desire the current product. The customer has a variety of companies to choose from, and if the product does not keep up to date, then the company will find itself in trouble or out of business. The governing board of the company is likely to applaud improvements, especially if it expands the customer base. Obviously, a company that only sold manual

typewriters a decade after its competitors had introduced electric typewriters would find itself in trouble.

Although public and private tertiary universities are lampooned for an inability to change, institutions have adopted sustainable technologies throughout the 20th century. Chalkboards gave way to boards that utilized magic markers. Ancient gymnasiums morphed into student centres with multiple activities and state-of-the-art fitness centres. Mimeograph machines gave way to Xerox machines. Slide projectors became more advanced audiovisual projectors and then PowerPoint. The faculty and administration and boards adapted to the times and their competitors by utilizing sustainable technologies.

However, the pattern is clear. The technology improves over time, the customer base expands, the cost of the invention drops, and, at some point, the disruptive technology overwhelms companies focused on sustainable technologies. Boards were focused on improving their product, not inventing a new one. Frequently, the traditional companies do not see the upstarts as competitors, not only because they are miniscule, but because they are after different markets. The result, however, is that, in a matter of years, computers make typewriters obsolete, and the telephone does the same for the telegraph. The traditional companies belatedly try to adapt, but they cannot compete. Apple and Microsoft drive Olivetti and Smith Corona out of business.

Who is responsible for a company going out of business? Ultimately, a board oversees the operations of the organization, and, to the extent that a company goes out of business, one might plausibly blame the board. Others might blame the vice rector or president. At the same time, many well-run boards and successful senior administrators have focused on improvement through sustainable technologies. Disruptions are innovations that cost time, money, and focus. Not all disruptions are successful. When disruptions take off, they also expand rapidly. One could conceivably claim that an administration ought not to be criticized for focusing on improving basic operations rather than on risky experiments that might take the company in an entirely different and unprofitable direction.

Perhaps the most obvious and most recent example of a beneficiary and a casualty of disruptive technology is online social media and the newspaper industry. When outlets such as *The Huffington Post* began, no one really saw them as a competitor to the *Los Angeles Times*. A decade later, the newspaper industry is in decline, and online media such as magazines, apps, blogs, and even Twitter, have overwhelmed the traditional competition. Newspapers were late to utilize social media, and, although one or two, such as *The New York Times*, may survive, their survival will likely be as part of a social media outlet. In related fashion, print copies of books and articles have foundered to such an extent that publishing houses and bookstores are rapidly becoming artefacts of the past.

Why would anyone think that the same sorts of changes are not likely to happen in higher education? As Christensen and his colleagues (2011) point out, "the theory of disruptive innovation has significant explanatory power in thinking through the challenges and changes confronting higher education" (p. 2). The technology enabler is online learning. Again, consider how previous disruptive

technologies were initially complicated, costly, and of interest to a limited few. And then at one point, that technology becomes more convenient, less costly, and easy to use and customizable (Christensen, Horn, & Johnson, 2008).

How those in higher education have spoken about and used online learning up to this point is in line with initial declarations about disruptive technology. Even those people who might be thought of as proponents initially thought of online technology as a poor imitation of the "real thing," which was the model of the sage on the stage. The users of the nascent technology were people who traditional institutions did not try to reach – perhaps the individual who was too far from a campus to take classes, or the individual who worked at times that most college classes were offered. The providers were not mainstream institutions, but those on the periphery – largely for-profit providers. Initially, those higher up on the educational food chain, so to speak, suggested that the implications for distance learning were irrelevant. Just as with examples from the steel and car industry, successful organizations – in this case, the Harvard's and Stanford's of the postsecondary world – could not see how a peripheral provider had anything in common with the campus-based classroom experiences that students received.

By the second decade of the 21st century, however, online learning has followed the trajectory of other disruptive technologies. Just as computers became ubiquitous, the exponential growth in online learning underscores how the technology has improved in quality and performance, making it desirable not simply to working adults, but to the broad panoply of postsecondary students. In 2003, about 10 percent of students took at least one online course; a decade later, the proportion is about 50 percent (Christensen et al., 2011, p. 3).

If I am correct about online learning being a disruptive technology, and, like other disruptive technologies, it forces changes with other products and services, then what other changes might come about that will impact all postsecondary institutions? Online learning is a model that changes the notion of "seat-time," for example, so one might expect a greater emphasis on learning outcomes, rather than credits earned, simply because a student spent a specific amount of time attending a class once or twice a week over a set number of weeks (Tierney, 2012). Thus, inputs, such as credit hours, are likely to give way to outputs, such as what has been learned. Even degrees may become less important than what is learned. A collection of faculty assessments over a four- or five-year time horizon that attests to a student having a particular GPA has been, until now, a proxy for whether the student learned anything while attending college. Ultimately, however, the mastery of the tasks graduates undertake tells employers and others whether the student learned anything. The other possibility with online learning is that costs could come significantly down as massive numbers of students use the disruptive technology.

The implications for faculty work, administration, and governance are significant, but unclear. We know, for example, that the fastest growing faculty group is part-time and contingent faculty. I do not envisage that will change in the near future. If the cost for faculty is decreasing, and online learning is able to tap into literally thousands of students when previously institutions were tied in a

manner similar to Baumol's cost disease, then the expense for faculty will go down (Brewer & Tierney, 2011). At some point, the rationalization for administrative costs also will no longer be tenable; in fact, that discussion has just begun. Significant, unsustainable overhead costs are not viable as product costs decrease with one's competitors.

CONCLUSION: ACADEMIC WORK IN WORLD-CLASS PUBLIC INSTITUTIONS

My assumption has been that if the current criteria for the rankings of world-class universities remains the same, then public research universities are going to face a two-fold problem. On the one hand, the state is going to be unwilling or unable to fund these sorts of institutions that enable them to keep pace with private research institutions, at least in the United States. Although funding from new sources, such as private individuals, may help in part to close the gap, a public regulatory system that is neither efficient nor effective may slow down change precisely at a time when innovation and experimentation become paramount.

On the other hand, disruptive technology is a challenge for all world-class institutions, but especially those institutions which are most immune from change. Recall that one of the lead researchers from UCLA commented that at USC change was not so difficult. Disruptive technology has the potential to transform tertiary universities in radical manners. For world-class universities, the changes in teaching and learning may be as significant as at other kinds of colleges and universities. For research to be maintained, there needs to be a fiscal infrastructure which public institutions may not be able to match at the levels of their private counterparts. My point here is neither to suggest the end of public research universities as world-class institutions nor to imply that the current definition of what constitutes world-class status will be eliminated. Indeed, in countries other than the United States and perhaps in Europe and Australia where privatization tends to run rampant, there may be an opening to assume world-class status with a vigorous support of public tertiary education. However, a commitment to the status quo, or a lethargic response to the changing conditions pertaining to technology and social media, will present significant problems for any institution. And my assumption is that disruptive technology also will augur changes in how we think about and define world-class universities.

NOTE

[1] Figures are not adjusted for inflation.

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10. ON MERGERS AND MISSIONS

Implications for Institutional Governance and Governmental Steering

INTRODUCTION: THE DRIVING FORCES FOR INSTITUTIONAL RE-PROFILING

Three inter-related factors seem to be driving universities to redefine their institutional profiles:

- Global competition and the strive for prestige spurred on by global rankings, or the push for world-class universities;
- National strategies for diversification, or the search for world-class systems;
- Changing economic conditions related to growth, or the decline of investment in higher education and research budgets, which in Europe is mostly driven by crisis-related austerity or recovery policies.

These factors push universities to reconsider their institutional profile, particularly in terms of:

- Breadth and depth: aiming to rationalize, expand, and/or focus the range of teaching programmes and research fields;
- Size: aiming to achieve efficiencies of scale, to develop critical mass, and/ or to enhance market share.

Universities will make strategic choices with respect to these two major dimensions, by taking into account the strength and sustainability of their resource base at local, regional or national levels. Global outreach will be particularly important for established and up-and-coming world-class universities.

Maintaining or building sufficient impact will be important in all cases. A broad comprehensive profile and sheer volume is often considered to be the best recipe. In other cases unique selling points (USPs) are considered to be the basis for a certain degree of specialization and the profile of a niche player (either being part of a larger configuration or stand alone).

In many cases these processes lead to forms of collaboration, ranging from loose alliances, to coalitions, or actual mergers, and they may concern international, private-public, and cross-sectoral partnerships.

This obviously affects the missions of universities, but how exactly? And does it in fact increase the diversity of the higher education system as such? How do we know, and to what extent are we actually able to measure that, and to relate institutional profiling to system-level performance or success?

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 137–151.

DIVERSIFYING THE HIGHER EDUCATION SYSTEM

Governmental initiatives underpinning system-level diversity have been undertaken in recent years in several European countries, including England,[1] Germany,[2] France,[3] the Netherlands,[4] Ireland,[5] and Denmark.[6] These strategies usually seek to enhance diversity in terms of institutional mission and programme provision, and may include measures to enhance excellence, thematic focus, to introduce new types of providers and provision, models of education, and the (re-) configuration of institutions (e.g. through networks, alliances, clusters, or mergers). Such initiatives can be seen as attempts to shape world-class systems. They seek to build (and/or sustain) world-class universities, while they may at the same time need to counterbalance the trends towards isomorphism resulting from the intrinsic strive for world-class status. It is realized that more than just top-research profiles are needed to serve the diversity of demands from stakeholders, for instance from students and their future employers for professional skills, while academic drift may actually disserve such demands. In other instances, issues of insufficient institutional scope may need to be addressed, in order to avoid the collapse of small and/or isolated institutions.

European governments generally prefer to invite bottom-up initiatives by institutions in the context of nationally defined goals, to which the institutions are expected to contribute. But although governments may avoid imposing top-down collaborations in too specific or prescriptive ways, some impose particular configurations from which most institutions cannot easily dissociate themselves, for instance, the poles of competitiveness in France, the regional clusters in Ireland, or the university associations in Flanders. Steering is further shaped through various types of performance-based funding arrangements, aiming to evaluate the institutions' contributions to the national agenda, for instance, as exercised by the Irish Higher Education Authority, the Dutch Review Committee for Higher Education, both to some extent modeled after the Hong Kong University Grants Committee. This is sometimes accompanied by extra investments (e.g. in Germany, France, and Denmark), but in other cases rather by governmental budget reductions (as in Ireland and England).

INSTITUTIONAL RE-PROFILING THROUGH COLLABORATIONS, ALLIANCES, MERGERS

A recent European study (Estermann, Benntot, Pruvot & Laeys-Kulik, 2013) confirms not only the trend towards performance-based funding, but also that this is often accompanied with large-scale restructuring through mergers and excellence initiatives ("hubs"). Over fifty percent of the publicly-funded budget of universities is accompanied by performance contracts, and in two-third of the countries such contracts are used more generally (p. 11). Policies in response to budget constraints and aimed at reshaping the higher education landscape (i.e. differentiation) refer to types of system-engineering, which in almost all countries include the consideration, or taking actual steps towards, concentration processes, such as university mergers. Universities are in most cases driving the process in

collaboration with the public authorities. A top-down approach where the merger processes are led primarily by the government is much less observed, although it may be difficult to assess who is in the driving seat in certain stages of the process (ibid., p. 12).

In response to these more or less irresistible pressures, institutions may decide to join forces and engage in different types of collaborations, alliances, or actual mergers. As described by HEFCE (2012), there is a wide spectrum of options. These range from soft configurations (e.g. a network, consortium or association), which can be characterized as flexible, low risk, and usually involving only a part of the organization, and can be easily unwound and are less costly to achieve, to the hard side of the spectrum, where we find the full merger, and which is typically fixed, higher risk, concerns the whole organization, is not easily unwound and is costly to achieve. Various other models (e.g. joint institutes, joint faculties, or federations) exist between these two ends of the spectrum. Models of collaborations and mergers and their rationale have also been worked out by Stanfield (2011) and Goedegebuure (2012), among others.

International alliances at the soft end of the spectrum and full mergers at national level at the hard end of the spectrum have in particular drawn the attention of researchers. Findings indicate that although international cooperation and alliance formation increased in the late twentieth and the early twenty-first century, this did not change the higher education landscape to the extent it has sometimes been proclaimed. This was explained by the complexities faced by institutions that were still predominantly nationally embedded. They operate within a complex global – national paradox, as national contexts differ substantially, often creating obstacles for deeper cooperation (Beerkens & van der Wende, 2007). A global integration versus local responsiveness dichotomy was also found to be complicating the strategic management of branch campuses (Huisman & Shams, 2012).

At national level, however, the landscape has been seriously changed in a range of countries through mergers between institutions. They have sometimes been an essential part of governmental policies, creating a lot of turmoil and opposition, yet effective drivers of system change or a means to deal with deficiencies. Successful examples can for instance be found in Finland, Denmark, France, Australia, South Africa, and China. Recent trends in response to increased global competition demonstrate that policy-induced merger strategies are now less focused on "sorting out the system" and more prestige driven, aiming to create world-class universities (Goedegebuure, 2012).

Estermann et al. (2013) found that in Europe, rationalizing funding allocation and the prospect of economic gains are the main drivers of merger processes and that financial aspects matter in the decision by universities to enter into other types of collaboration, as well. Other motivations are to reinforce visibility and consolidate the (international) position of the institution(s), along with an intention to enhance quality and reduce fragmentation in the system. Joint research seems to be primarily motivated by internationalization.

Goedegebuure (2012), however, notes that the rationale for mergers may in many cases have been based on at least some questionable assumptions regarding the expected outcomes in terms of economies of scale and scope. The ideal size of an institution in terms of critical mass or strategic of competitive advantage is virtually impossible to define, as it is always context dependent. It seems that it is not so much size at such, but the creation of large research budgets in combination with limited numbers of students that is a successful strategy to build academically stronger institutions, as measured in terms of scientific impact scores (van Vught, 2012), as well as the relative proportion of graduate students as compared to undergraduates, should be considered.

The use of the different types of collaborations, alliances, or mergers may also differ between categories of institutions. World-class universities tend to reach out globally in activities aimed to underpin their profile as a global brand. A more recent global branding effort is the statement on the characteristics of the contemporary research university, signed by the leagues of research universities in the US, Europe, Australia and nine Chinese universities.[7] Collaboration is often undertaken in alliances such as LERU, U21, in networks or platforms (for instance Coursera or EdX for delivering MOOCs), by entering into branch campus arrangements (like NYU in Shanghai or Yale with the National University of Singapore), or joint research activities. These international dynamics are much discussed and increasingly systematically described (Edelstein & Douglass, 2012a), but their impact is still rather difficult to quantify [see for example Huisman and Shams (2012) or Edelstein and Douglass (2012b) on branch campuses and Daniel (2012) and Department for Business, Innovation and Skills (2013) on MOOCs]. At the same time, second-tier institutions may be more inclined or actually forced to engage in collaborations at national or regional levels.

These different dynamics contribute to change in both the global and the national higher education landscape. Gallagher (2012) presents a future global scenario with the following types of institutions (see also in van Vught, 2012, p. 19):

- A top echelon (perhaps around 50) mainly stand-alone highly prestigious, highly resourced comprehensive universities.
- International consortia of a next group of (perhaps 100-200) universities, sharing resources and offering joint and mutually accredited programs.
- A range of niche institutions with specializations in a few fields of research and education, both corporate and as public-private partnerships, some of them linking with professional occupational practice.
- A great diversity of primarily local and regional teaching institutions, both public and private, as well as in public-private partnerships.
- A set of high-tech, primarily virtual global teaching providers.

The current dynamics seem to imply that these categories may not be mutually exclusive, as top echelon institutions also engage in international alliances and high tech provision (MOOCs). Further questions are whether only comprehensive institutions could belong to the top 50 and if this would not merely be the result of

the criteria for measuring that status, such as proposed by global rankings (van der Wende, 2011). More specialized niche players with a public-private funding base are after all already strong players at the top, especially when they are able to combine this profile with a relatively small student body and large research budget. The comprehensive university may even be under more pressure in certain contexts than more specialized institutions. For instance in Europe, where a combination of mobility and funding trends seem to cause an increasing concentration of especially high-tech research capacity (in the natural and life sciences) in a limited number of regional hubs, this is likely to be at the detriment of the broad comprehensive profile of universities in certain weaker regions and countries (van der Wende, 2013). The university associations that together issued the HEFEI statement include some 100 comprehensive universities may not only be competing for 50 places in the top echelon in the above presented global scenario, but may also be better positioned for success in this race than others. It has been discussed extensively in the higher education literature (by Clark Kerr, Bob Clark and others) that the comprehensive university model is not fit for all contexts and that specialized universities are likely to find change easier than comprehensive ones.

It would also be interesting to analyse whether there is a threshold ranking position from where on institutions feel that they cannot become or remain a world-class university on their own. Another question could be whether and to what extent world-class universities would be drifting away from the national system and context by becoming more globalized and, perhaps, less nationally or locally rooted – or even "footloose," like multi-national companies (Görg & Strobl, 2003) – as a result. The Emerging Global Model (EGM) university, as characterized by Mohrman et al. (in King, 2009), demonstrates indeed a mission to transcend the boundaries of the nation state, world-wide recruitment strategies, and interaction with multinational governments, international NGOs and multi-national companies. This model requires new relationships with governments. It is extremely costly, beyond the usual government support, attracting funding from private donors and corporate partners and generating income by the creation of for-profit branches and businesses. New modes of operation and flows of funding are being sought to compensate for national constraints. And new poles of attraction emerge, as illustrated by the following quote: "Whilst funding in most European universities is being eroded or stagnates at best, some Asian countries are investing amounts unimaginable to us in higher education and research facilities. Their scientific quality generally still falls short of ours, but their facilities are well ahead. For leading researchers in many fields, the BRICS are therefore increasingly the place to be."[8]

Institutions are increasingly able to overcome the barriers to (global) partnerships and operations in different national and local contexts. Some convergence in regulatory governance across jurisdictions is even observed (King, 2009). The strategic allure of global outreach may turn certain universities into "giant global magnets," which could make them even "too big to fail." In analogy

with the banking sector, it is even proposed that they should then be the subject of stress tests.[9]

At the same time, global collaborations may be inspired by local or regional initiatives. Interesting new endeavours in this respect are Cornell NYC Tech, the joint venture of Cornell University with Technion – Israel Institute of Technology, in response to a competition to establish a new technological institution launched by the City of New York. The winning consortium was international, including a technological institution, appealing to local and corporate funding propositions and providing a new local competitor to NYU, which is in its turn reaching out more and more globally. A comparable initiative to establish a "technological institute for metropolitan solutions" was recently taken by the City of Amsterdam. The two local universities, University of Amsterdam and VU University Amsterdam, which are joining forces to become world class by merging their science faculties,[10] lost the competition against an international consortium of Delft University of Technology, Wageningen University and MIT, supported by a range of multinational corporate partners, including Shell, CISCO and IBM.

While these dynamics cannot be denied, institutions that engage in (inter)national collaboration, alliances, or mergers face a range of questions, challenges, and dilemmas. Especially those related to mergers will be discussed in the next section.

MERGERS AND MISSIONS – RELATED QUESTIONS AND DILEMMAS

From a sociological perspective, universities are seen as social organizations with distinct structures, values, norms, traditions, and symbols. These are embedded in their history and culture, define their behaviour and relate to their missions and objectives as an organization. Generally speaking, mergers are potentially disruptive to such organizational structures and cultures and require appropriate management styles, if they are to generate competitive advantage (Harman & Harman, 2003, 2008).

Specifically in relation to their mission, mergers imply tensions around institutional size and the missions for teaching and research. While increased volume may allow for a critical mass to support research performance, it may complicate performance in teaching. Institutions top-ranked for their teaching are often relatively small[11] – small units tend to create better conditions for student learning, and world-class universities mostly do not belong to the world's largest universities. Yet, if institutional funding is (too) largely based on student numbers, some institutions may feel the need to increase the size of their student population in order to strengthen their resource base for performance in research. Estermann et al. (2013) illustrate that performance-based funding formulae may increase this risk as they are often based on input criteria for teaching (e.g. numbers of undergraduate and graduate students), combined with output indicators for research (e.g. publications, doctoral degrees awarded, and amount of external research funding and patents acquired). This may not only be complicating their basis for success in terms of scientific impact (van Vught, 2012), but also

jeopardize objectives for improving education quality as part of the merger ambitions (Ursin et al., 2010).

In re-defining their mission, merging institutions need to make very deliberate choices to define the (new) balance between their research and teaching missions. But are there actually sufficient incentives to make a positive choice for other than the reputational top-research profiles? For instance, whether to focus more on professional or vocational level of qualifications? In fact, mergers often seem to coincide with academic drift, as can be observed in for instance in England (Locke, 2007), the Netherlands and Ireland.[12]

If the conditions for mergers are not directly set by the government (i.e. policy-induced mergers), the level of institutional autonomy is conditional to making such deliberate choices. For instance, whether to merge, eliminate or open teaching programmes as the institutions see fit, according their (new) profile, somewhere on the range from comprehensive to specialized; or whether to regulate the size of their student population at undergraduate and graduate levels, in line with their research ambitions and strengths. The regulatory context also defines whether institutions are autonomous to engage into partial (e.g. joint faculties) or full mergers between them on their own behalf and whether they can include international or private-sector partners, or partners from different (higher) education sectors. Current attempts towards inter-university collaborations and partial mergers in the Netherlands are, for example, complicated by regulations inhibiting flexibility in adjusting the student profile (i.e. selective admissions), fee levels, programme offerings, and cross-sector provision. Dutch universities are clearly more autonomous in research than in teaching,[13] which seems to hinder successful collaborations and merger strategies, and perhaps even more so their potential for global outreach.[14]

When governments do induce institutional re-profiling in terms of collaboration or actual mergers, complication may arise from the involvement of different branches of government. Besides the ministries responsible for higher education and/or research, ministries of finance may also be involved regarding fiscal issues,[15] or anti-trust authorities regarding competition rules.[16] The interplay between the various authorities does not always provide (at first) a consistent context for collaboration or merger initiatives.

Partial mergers or softer types of collaboration, such as regional clusters (for instance in Ireland), can be particularly complicated as they may find no clear legal basis in existing legislation, which traditionally regulates the relationship between the government and an institution as one legal entity. Blurred versions of the latter may complicate issues around accountability and responsibility, for instance among the members of a cluster of institutions. Creating a new entity with a single institutional status may be more effective in such cases, but leaves less flexibility and comprises more substantial processes of change.

Governments may actually lack the appropriate mechanism to steer such type of collaborations in terms of quality assurance, accountability or performance-based funding. Or they relate them to regions as geographical areas, which may have relevant economic agendas but not necessarily a steering capacity over higher

education institutions.[17] Also, local authorities can be interested, but not (fully) competent in terms of higher education steering, funding, and governance.[18] Thus, in many cases new institutional profiles will require adjustments in legislation, and the reconfiguring of their legal status and their relationship with the government, as was the case for instance in Finland (Aarrevaara et al., 2009).

Obviously and as said before, mergers also affect the institution's internal governance arrangements, including the relationship between staff and the university as their employer. Gains in status and efficiency may be achieved, but in parallel both the leadership role and the commitment of staff may become weakened in the merger process (Puusa & Kekale, 2013) and such gains may also come at the expense of academic and scholarly development (Locke, 2007). Critics question whether established university governance structures are generally able to meet the challenges resulting from declining governmental funding and global competition (Trackman, 2008) – challenges that are usually among the main driving forces for mergers, as discussed before.

Case studies [19] indicate that achieving world-class status through mergers involves strong decision-making powers in the centre, including the full control over a unified budget at an early stage and a strong focus on research. However, a general weakness in mergers is perceived to be a concentration on structures before thinking about the academic plan in terms of research excellence and congruent educational provision. It is acknowledged that mergers hardly ever meet the expectations of the partners or sponsors in the short term. It takes at least three to four years to see the first results. Institutions may therefore, and because of the limitations in their regulatory environment as described above, look for alternative models.

Federations[20] can be seen as an alternative model in terms of a more flexible version of a full merger and are supported by the notion of shared governance. They occur both in unitary governance structures (e.g. Universités de Paris in France or the KU-Leuven – Association Leuven in Belgium) and in dual governance structures (e.g. the University of London, or the University of California). Recent developments in the UK and the US indicate that although federations may be seen as more flexible, they may in fact turn out to be too rigid to effectively accommodate the increased institutional autonomy needed to respond to new demands and (global) challenges. Especially when governmental funding is in decline, this seems to lead to a trend to decentralize the relevant decision-making powers (notably related to student enrolment, tuition fees, and degree awarding powers) to their constituent entities (colleges, campuses, etc.).

The University of London for instance is now viewed as a very loose federation since it has no longer has an institutional budget and the colleges are now funded directly by HEFCE (since 1995) and some have their own degree awarding powers. Consequently the University of London is perceived by some as not more than "a shell," providing a useful brand name especially for its smaller colleges. The University of California in its turn proposes to create and delegate more responsibilities to its various campuses, through the introduction of campus boards

with control over revenue streams (notably tuition fee levels) and enrolment quota (Birgeneau et al., 2012).

It is suggested in these contexts that the federal model is devolving, decentralizing or – according to some – even in (terminal) decline. However, it is also noted that in less market-driven environments, where institutions are more geared towards cooperation, it may have a stronger stand (Scotland is suggested as a case in point). The value and future of a federal model for its constituent entities will indeed depend on their need to compete (globally). Advantages for such competition in terms of identity and (global) brand may be very unevenly spread across the constituent parts, while a common academic agenda may be challenged by its size and internal complexity. The same applies to major rationalizations, integration, and cost efficiencies which may be difficult to achieve, but essential to generate value for money in terms of the services the federation is able to provide to its constituent parts.

Joint ventures more generally seem often weak in terms of their governance. Usually no lay members, external stakeholders or constituencies are involved. In that sense joint ventures are often not properly institutionalized and can thus fall apart very easily as there is no strong sense of ownership. This may even be more likely when the representation of internal stakeholders is also weak.

ACHIEVING SYSTEM-LEVEL DIVERSITY?

The aims, rationale, and importance of diversifying higher education systems are well known and widely recognized. Especially in the context of global competition, national higher education policies cannot avoid trying to optimize their higher education and research systems in terms of excellence and diversity (van Vught, 2012, p. 22). Many countries are striving for more diversification in order to build world-class systems. Salmi (2009) argues that world-class systems support world-class universities, but that countries with world-class systems also have a range of other strong institutions, such as technical colleges, community colleges, and distance education institutions, to satisfy the fundamental and wider needs for higher education. Altbach (2007) sees a differentiated system as a prerequisite for the rise of the research university and crucial for the success of countries, including developing countries which should also have a variety of higher education institutions. van Vught (2012) also notes that a narrow focus on only the top universities will not be sufficient to meet the wider national and regional needs. At the same time, and as stated above, only a few countries can actually support a world-class university in terms of the resources needed to sustain their performance and position.

Achieving system diversification requires governments to demonstrate adequate steering capacity (coordination powers) and resources. Choices for top-down or bottom-up approaches may be defined by their actual capacities, rather than by clear ideas about effective concepts of cooperation versus competition between institutions as a way to enhancing system-level diversity. Governments may simply find it difficult to designate different status to institutions. A particular challenge

lies in providing effective counter-incentives to avoid institutional isomorphism and a homogeneous landscape rather than a differentiated one, to avoid a race to the top (academic drift) and thus to prevent the growth of building world-class universities at the expense of the rest of the system (Marginson & van der Wende, 2007, 2009b; van der Wende, 2008; van der Wende & Westerheijden, 2009). Key policy questions are thus: what are successful strategies to achieve a combination of excellence and diversity at system level? In other words, how to balance strength at the top end with the wider spectrum of issues of national interest?

An important step towards answering these questions lays in the possibility of adequately measuring system-level diversity, and, secondly, to relate it to the various intended outcomes and to the performance of the system as a whole. Recently, some early attempts have been undertaken in these directions.

The U21 Ranking of National Higher Education Systems (Williams et al., 2013) was developed with the aim to shift the discussion from the existing rankings of the world's best universities to the standing of the whole higher education system in each country. It looks at resources, environment, connectivity and output and to overall performance. It allows for the benchmarking of national systems against performance in other countries and controls for the size of the national system in most measures. It combines a range of research-orientated output variables with two others, one on enrollment and one on graduate employment. Diversity of institutions is included as one of the sub-variables of the qualitative measure of the policy and regulatory environment. It applies the OECD classification of public, government-dependent private, and independent private institutions. This reflects mainly their legal base and is done (presumably exclusively) for institutions classified as tertiary type A/advanced research programme in the Carnegie Classification. 2013 data suggest that a country can improve its ranking due to an increase in the diversity of its institutions (p. 14). However, it would be interesting to know to what extent this refers to the diversity of mission and institutional profile, i.e. characteristics beyond the different legal bases of institutions. For this purpose, it could be recommended to apply (all) categories as proposed for instance by the Carnegie classification or U-Map[21] instead.

Other attempts to map the "best university systems" tend to focus exclusively on the performance of research universities, for instance, by taking Academic Ranking of World Universities (ARWU) and Times Higher Education World University Rankings (THES) to the system level and classifying the best system as those who have the largest proportion of their universities in the top of these rankings (Goedegebuure, 2012; van Vught, 2012).

As demonstrated in Table 1, some overlap in outcomes between the two above-mentioned attempts can be observed; twelve out of the top fifteen ranked countries appear in both tables. This should not be a complete surprise, since both schemes are to a large extent based on current global ranking indicators and both control (although to a varying degrees) for system size. The overlap, or consistency, seems at this point thus to be explained primarily by the dominance of data used on world-class universities and the relative weight of their research outcomes. Secondly, when the number of world-class universities is taken relative to size of

the system, this obviously pushes small countries with strong universities to the top.

Table 1. Overlap between U21 Ranking of National Higher Education Systems (2013) and ranking of the "world best university systems" by Goedegebuure and van Vught (2012): twelve countries that appear in the top fifteen in both rankings.

	Country	*U21 Ranking of National HE Systems*	*"Best University Systems"*	*Average*
1	Sweden	2	3	2.5
2	Switzerland	3	5	4
3	Netherlands	7	1	4
4	Denmark	5	7	6
5	Norway	11	6	8.5
6	Australia	8	10	9
7	New Zealand	14	4	9
8	Finland	6	13	9.5
9	Canada	4	15	9.5
10	Belgium	13	9	11
11	UK	10	14	12
12	Germany	15	12	13.5

Thus, while the US comes out on top in the U21 table, it is absent in the top 15 "best university systems," where the number of top universities is strictly taken as a proportion of all institutions in the system. However, this mapping ignores the actual rank of the country's world-class universities (in the ARWU top 500 and THES top-200).

The Netherlands is number one in terms "best university systems," with over 90 percent of its universities top ranked in ARWU 500 and almost 80 percent in THES 200, while only seven on the U21 ranking. It is suggested that the simple explanation is that binary systems, with a relative small research university sector, have an advantage in this comparison over (large) unified systems (Goedegebuure, 2012). The analysis, however, needs to be refined and go beyond the basic characteristics of a unitary versus binary system, or limitation to research type A universities and their legal basis. These are obviously important dimensions of system diversity, but still insufficient to explain whether and how system-level diversity actually contributes to overall system performance, which in turn should not only or predominantly be measured as the aggregate performance of universities top-ranked for research. Clearly, these measures of system level diversity still lack sufficient explanatory power. Despite its strong position, experts argue for instance that the Dutch system is (still) not sufficiently diverse (van Vught, 2012, p. 27), while others may find that it lacks excellence. Both may be true at the same time.

But we would rather like to be able to assert the extent to which systems have actually become more diverse, and if so, how; and whether this was the result of national re-structuring or diversification policies, and if it contributes to the (desired) system-level performance. After all, numerous initiatives aimed at creating larger (and often also more comprehensive) universities modelled on the characteristics of the world-class university have been observed (Marginson & van der Wende, 2007, 2009a; Salmi, 2009), including cases using (different types of) mergers to position parts of the system for global competition at the top end. For instance, China, where institutions have merged and new ones established on the ideal of the research university model, while there has been virtually no policy to develop alternative or more vocationally oriented universities (Douglas, 2012). These cases can be seen as in fact rather serving the aim for excellence rather than for diversity, and strengthening the elite universities for global performance, rather than stimulating others to meet the wider national and regional innovation needs.

However, if other choices were made, what were the conditions that allowed these movements resist the coercive trend towards the growth of global winners? Did they happen more in certain sectors or type of institutions than in others? What (supra-) national (or regional) policies enable this best, which status and types of steering and degrees of autonomy are recommended?

CONCLUSION

Our measures of system-level diversity and performance will need to be developed further and beyond a basic legal categorization of institutions, and beyond direct and indirect measures of research output as derived from the current dominant global rankings. Further steps will need to be taken, especially to allow for the inclusion of the quality of teaching. World-class systems are not the same as the aggregate performance of universities ranked as world class and should not be measured as such. If we believe such systems need to be diverse, we should aim to measure the dimensions related to diversity better, both on the output side (beyond research performance indicators) and also regarding the independent or contextual variables (system characteristics). The use of existing classification systems will be helpful. In turn, this will allow us to assert whether governments are in fact successful in re-structuring and diversifying higher education systems for better performance in a range of areas which are all relevant to the knowledge economy and for a coherent society.

NOTES

[1] Department for Business, Innovation & Skills (2012). A new fit for purpose regulatory framework for the higher education sector. See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/197258/12-890-government-response-students-and-regulatory-framework-higher-education.pdf.

[2] Federal Ministry of Education and Research. Excellence Initiative for Cutting-Edge Research at Institutions of Higher Education. See: http://www.bmbf.de/en/1321.php.

[3] Ministry of Higher Education and Research. Strategy. See: http://www.enseignementsup-recherche.gouv.fr/cid70897/une-loi-pour-l-enseignement-superieur-et-la-recherche.htm.

[4] Advice from the Veerman Committee on a sustainable higher education system: Differentiation threefold (2010). See: http://www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2010/04/13/advies-van-de-commissie-toekomstbestendig-hoger-onderwi.html.

[5] Department of Education and skills (2011). National Strategy for Higher Education 2030. See: http://www.hea.ie/sites/default/files/national_strategy_for_higher_education_2030.pdf.

[6] Ministry of Science, Innovation, and Higher Education. University mergers of 2007. See: http://fivu.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/university-mergers-of-2007.

[7] HEFEI Statement on the Ten Characteristics of the Contemporary Research Universities. Announced by AAU, LERU, Go8 and C9. http://english.anhuinews.com/system/2013/10/11/006134894.shtml.

[8] Speech by the President of Delft University of Technology to the 32nd conference of rectors and presidents of technological universities in Europe (Milano, 2013). Delft opened four joint research centres in China in the last couple of years.

[9] Ibid. Note: Questions related to the matter were recently asked by Dutch members of Parliament and the Dutch government recently introduced a conditional "merger test," following mergers of (post)secondary institutions that led to considerable financial risks and overall reputational damage to the sector.

[10] An initiative which has been, at least temporarily, halted by students' protest over what was considered to be a prestige project, with too strong a focus on research performance and a threat to the quality of teaching and student services.

[11] Also in the Netherlands' ranking for teaching, small university colleges and relatively small hogescholen consistently figure in the top.

[12] When the Dutch hogescholen merged and were then upgraded to universities of applied science, a strong focus was developed on applied research and graduate programmmes, while virtually no investment was made in developing associate degrees and strengthening of bachelor programmes. Likewise in Ireland the Institutes of Technology seem to overemphasize provision at level 8 at the expense of investment in level 6 and 7 qualifications.

[13] Although the Netherlands may be ranked first for its higher education regulatory environment (including measures of autonomy) in the 2013 U21 ranking of world class systems ((Rassenfosse et al., 2013), it came out only in the medium ranks for organizational autonomy and in the lowest ranks for academic autonomy in the EUA ranking, due to restrictions in setting fee levels, student admissions and programme accreditation (Estermann et al., 2012).

[14] As recent government regulations also inhibit overseas teaching provision.

[15] For instance regarding VAT regulations applicable to shared service centres (Stanfield, 2011).

[16] E.g. the Netherlands Competition Authority (NMA), or European authorities in this area.

[17] The proposed regional clusters in Ireland require for instance new regulatory and legal frameworks to clarify the responsibility and accountability of individual institutions within a cluster vis a vis the national government and each other. Links between the national government's role and that of regional authorities and the institutions should also be defined more clearly.

[18] The city of Amsterdam which launched the initiative to establish a new technological institution, holds for instance no steering capacity over universities and has no structural role in funding them either.

[19] Van der Wende (2012). The Amsterdam Academic Alliance. Governance Models and Strategic Orientations. A Reference Document. University of Amsterdam – VU University Amsterdam (internal document).

[20] Ibid.

[21] Project on the European classification of higher education institutions. See: http://www.u-map.eu/.

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ANDRÉS BERNASCONI

11. TOO SMALL TO SUCCEED

Middle-Income Nations and the Quest for Distinction in Global Higher Education

INTRODUCTION

The vast majority of universities leading in worldwide rankings are located in developed countries with large economies, such as the US, Germany or the UK. Developed countries with relatively smaller economies also have a solid presence: witness the Scandinavian nations, the Netherlands, or Israel.

Considering these facts, are rankings and the companion concept of a world-class university relevant to the developing world? In this essay, I shall discuss this question with reference to Chile, a small, middle-income country, with no universities in the top 400 slots of the Academic Ranking for World Universities (ARWU) in 2013, and just two in the 400-500 range.

The case of Chile may be illustrative of the general class of developing economies hovering around the level of US$20,000 per capita GDP (PPP), that is, the global "middle class." This category includes nations as diverse as, for instance, Botswana, Croatia, Estonia, Greece, Hungary, Latvia, Portugal, Malaysia, Oman, Poland, Romania, Russia, or Turkey, none of which have a university in the top 300 of the ARWU 2013.

Notwithstanding the wish of political leaders in some "middle-class" countries to place at least one of their national universities in the forward positions of the global rankings – the case of Russia comes to mind (see the Froumin and Povalko's chapter in this book) – my contention is that in Chile, and in countries such as Chile if this turns out to be, as I believe, a more general pattern, the "rankings game" is akin to a spectator sport: universities and governments are aware of the rankings, follow them with interest, but see them as a game which they do not play. Climbing positions in rankings does not appear as part of policy or planning, either at the governmental or institutional level, and the basic reason why this is so is that their universities, even the best ones, are too far away from the ideal of a world-class university.

In this chapter, I will first introduce in very broad contours the features of higher education in Chile, so as to provide some context. I will then examine the cases of the two leading research-oriented universities in Chile, by way of a few indicators of their functions, resources, and performance. These cases, I hope, will give the reader an idea of where they stand with regards to the notion of a world-class university, and the road that would lie ahead of them if they chose to seek

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 153–161.

global recognition. For the sake of regional context, these two Chilean experiences will be contrasted with the case of a Brazilian university of comparable size, which is much further ahead in embodying the attributes of a world-class university, but not quite there yet.

I will then move to consider the feasibility of a country such as Chile supporting a world-class university, and the obstacles to this path emerging from the size of the economy, the characteristics of the higher education system and its financing, and the policy environment for higher education. Again, this will be done in contrast, this time to two other similarly-sized economies, Finland and Singapore. The final section reports my conclusions in light of the discussion preceding it.

HIGHER EDUCATION IN CHILE: AS GOOD AS WHAT A MIDDLE INCOME LEVEL CAN BUY

Although some form of advanced studies for the priesthood were established in Chile during the Hispanic colonial period, higher education in Chile is a feature of the independent nation founded in 1810. Its first post-colonial institution, the University of Chile, was founded by the State in 1842. This was for over a century a rather small system: as of 1980, it included two public universities – the said University of Chile and the Technical State University – both based in the capital city of Santiago, although with regional branch campuses spread throughout the country. These were joined by three universities founded and maintained by the Catholic Church, and three private, non-profit secular universities organized by local professional and intellectual elites in the provinces. Private and Catholic universities were considered beneficial to the educational efforts of the country and hence benefitted from state funding, occasionally since the 1920s, and regularly since the 1950s.

But the present day configuration of the system is quite different. Its bases were defined during the early 1980s by the military dictatorship of General Pinochet, who had ousted the Socialist President Salvador Allende in a 1973 coup. Legislation approved in 1981 authorized the establishment, through private initiative, of new universities and non-university tertiary level institutions, called "professional institutes" (offering undergraduate education in applied professional fields), and "technical training centres" (offering two-year technical and vocational programs). Moreover, the regional colleges of the University of Chile and the State Technical University (now, University of Santiago) were turned into independent public universities, numbering 14 new institutions.

The aims of the military regime at the time were to expand access, introduce some institutional differentiation, break the political influence of the two large public universities, and foster quality through competition (Brunner, 1986). Almost 35 years later, the first three goals have been largely attained: enrolment multiplied tenfold, from 120,000 in 1980 to close to 1,200,000 in 2014. Chile's gross tertiary enrolment rates of close to 60 percent, and the net rate hovering slightly above 40 percent, are not substantially below OECD averages.

Chile has now 60 universities, 44 professional institutes, and 61 technical training centres. Public universities number 16, and although the University of Chile and the University of Santiago are nationally prestigious institutions, neither they nor their student unions command significant political influence by themselves. Competition for students has been fierce in a system funded, as will be explained below, largely through tuition payments, but vying for students has done little to improve quality. As a mechanism to foster improvement, competition had to be supplanted by accreditation policies, first enacted timidly during the 1990s, then expanded substantially in 2006.

The funding scheme for higher education in Chile was also redesigned in 1981. Public financial support decreased and universities were required to cover a growing portion of their costs by collecting tuition. A means-tested subsidized public loan programme was created to assist students unable to afford tuition payments. Finally, a National Fund for Scientific and Technological Research was set up in 1982 to distribute research funding to individual researchers on a competitive, peer-review basis. New private universities were to be funded entirely through tuition revenues; only since 2006 do their students have access to the state-supported subsidized loan programme and to some government scholarships. Also since 2006, these institutions have been allowed to present proposals for government grants to foster innovation and development in higher education.

About half of all students receive government financial aid in the form of tuition scholarships or loans, still insufficient for a country second only to the US in cost of tuition as a proportion of family income (OECD, 2009). Overall, private sources represent over 60 percent of funding for the system, whereas public monies account for less than 40 percent.

Affordability of higher education is high on the policy debate in Chile these days. Much of what caused the massive student protests of 2011 derives from loan exhaustion. Proposals to introduce free tuition and to expand the size and quality of public sector higher education are being developed by the current left-of-centre government coalition.

The last few years have seen an effort to expand graduate education, with increased funding for students both in Chile and abroad. Graduate enrolments in the country reached 46,000 in 2013, of which 10 percent pursue doctoral studies. These figures are a vast improvement over the ones prevailing a decade ago, but are still a lot smaller than necessary for catching up with Chile's need for advanced human capital. Therefore, an ambitious programme of scholarships for graduate study abroad was inaugurated in 2008, and it currently sponsors some 5,000 students pursuing masters and doctoral degrees across the globe.

As a result of this lagging graduate education, the stock of highly trained scholars and professionals in Chile is still small; the number of PhD graduates in the country is estimated to be around 8,000. Even though the vast majority of them work in universities, they barely register among the total of more than 60,000 academics in the university system. If one considers only full-time professors in universities (20 percent of the whole university professoriate), the proportion with doctorates rises to one-third.

There are two main reasons for the relatively high prevalence of a part-time faculty. One is a result of function: universities in Chile do not provide as a first degree a general humanistic or scientific education, but instead offer professional training programs leading to a license to practise a profession, which is issued directly by the university. Hence, much of the professoriate consists of practising professionals. Second, universities funded solely through tuition (the privates) or mostly through tuition (the rest) cannot afford to hire more full-time staff than they currently have.

THE LEADING UNIVERSITIES IN CHILE AND A BRAZILIAN BENCHMARK

I have explained elsewhere (Bernasconi, 2007, 2011) that Chile does not have the research universities that could fit the bill of a "world-class" university. This is not to say that Chile does not have good universities, or that its higher education system fails to serve the needs of the country. Quite to the contrary, the leading Chilean universities are among the best in Latin America, according to whichever indicator of output, efficacy or efficiency one chooses to use as a measure (CINDA, 2011), and the postsecondary system as a whole, notwithstanding its weaknesses and blind spots, has played a key role in the social, cultural and economic development of the country (OECD, 2009).

The point I have made is a different one: that the profile and attributes of the most research intensive universities in Chile still falls short, by a wide margin, of what is conventionally understood and formally codified as world-class status, namely, the recruitment of faculty and staff from the global pool of talent; abundant funding; and healthy governance with competent management (Salmi, 2009 & 2011). Although scientific clout is not listed as an essential part of being a world-class university, and a world-class teaching-only institution is theoretically conceivable, the fact is that all universities deemed world-class are also prime research hubs. Science, not teaching or service, is what gives them global visibility and name recognition, and what gets measured to produce the rankings that produce or reinforce their world-class status.

As I will show with the data below, Chile's top universities have not yet accumulated the concentration of research faculty and graduate students, or the scientific output, or the basic resources, from which the search for global talent, or ample funding, or effective governance and management, would serve to move a university to the major international leagues. They are not research universities, but teaching institutions which also carry out a fair amount of research (Bernasconi, 2007).

In other words, these universities still have some work to do to place themselves in the position from which an attempt to reach global standing could eventually meet success. From where they stand now, such a stretch would be futile. In the following section, the argument will be made that, at any rate, this endeavour cannot be the universities' alone: the government needs to share the same aim and that it has tasks of its own.

The two Chilean universities that usually make appearances in the ARWU are the University of Chile (UCH), established in 1842, and the Pontifical Catholic University of Chile (PUC), founded in 1888. Both show up in the 401-500 range in the ARWU 2013. Table 1 below provides data on their performance on key research indicators. Since it would be pointless to compare these two universities to top-ranked institutions, I have picked a distinguished Brazilian university, the State University of Campinas (UNICAMP, placed in the 301-400 range in the ARWU 2013), which is Brazil's number two in most rankings – following the University of Sao Paulo (USP), a much larger institution (positioned 101-150 in the ARWU 2013). UNICAMP's mid-size makes it a better match than USP for contrast with UCH and PUC.

Table 1. Chile's top two universities (UCH and PUC), performance in selected research indicators, compared with Brazil's top performer UNICAMP, years 2011 and 2013.

	Year	*Enrollments*		*Faculty*						
	(a)	Total	Graduate (%)	Total	Full-time (%)	PhD (%)	FT wtih PhD (%)	Publica-tions	PhDs conferred	Budget
			(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
UCH	2003	27.731	11.5	3.392	35.9	20.7	34.3	2.713	50	344
	2011	35.339	21.0	3.005	41.2	30.7	53.2	4.644	142	844
PUC	2003	19.676	10.5	2.349	43.4	48.9	71.6	1.819	37	359
	2011	25.277	13.9	2.984	50.9	52.3	77.1	3.856	96	692
UNICAMP (Brazil)	2011	44.519	60.4	1.727		98.0		8.383	818	1186

Note: (a) Unless otherwise noted, the data correspond to the years 2003 and 2011. (b) "% Graduates" is the proportion of graduate students in total enrolments. Indicators for "Faculty" consider: (c) Total headcount, (d) the proportion of faculty who are full-time, (e) The proportion of faculty with a PhD degree, and (e) The proportion of full-time faculty who are PhD holders. (g) Publications is the sum of all ISI-indexed articles published in the previous three years. (h) PhDs conferred are the numbers of graduates of Ph.D. programs per year. (i) Budget US$ Million is the yearly income budget of the university.

Sources: For University of Chile and Pontifical Catholic University of Chile: Anuario Estadístico del Consejo de Rectores, years 2003 and 2011, except for (g), the source of which is Thomson Reuters' Web of Science. For UNICAMP, the source is Anuário Estadístico de la UNICAMP, year 2011, except for (g), the source of which is Thomson Reuters' Web of Science.

World-class universities usually have a significant proportion of their enrolments at the graduate level, often matching or coming close to their share of undergraduates. This is important for international recruitment, since undergraduate students are less mobile than seekers of graduate degrees, and

therefore a global quest for talent can more reasonably take place with regard to graduate students.

UCH and PUC, however, are primarily undergraduate degree granting institutions, with their share of graduate enrolments (encompassing masters and doctoral candidates) reaching 21 percent at UCH, and 14 percent at PUC in 2011. While there has been an increase in these figures since 2003, the population of graduate students, especially at the PhD level, still falls short of the density typically found at world-class universities. In contrast, UNICAMP is predominantly a graduate school, with 60 percent of its enrolments at that level. Accordingly, UNICAMP conferred almost four times more PhD degrees in 2011 than the sum of those granted by PUC and UCH.

Perhaps the starkest divergence with the world-class model can be found in the faculty make-up. Full-time faculty are only half of the professoriate at PUC, and an even smaller fraction at UCH. A similar pattern emerges when looking at faculty with PhD degrees, slightly above half in PUC and not even one third of all professors at UCH. Since not necessarily those in possession of a PhD work full-time, or vice versa, one needs to consider how many of the full-time faculty hold a doctorate to get a sense of the research qualifications of the professoriate with the greatest dedication to the university. In this variable, PUC reaches 77 percent, and UCH 53 percent. Better, and improving rapidly since 2003, but still far from the nearly universal possession of a doctorate found among faculty at UNICAMP.

In view of this faculty make-up, it should come as no surprise that the 1,700 professors at UNICAMP published between 2008 and 2010 twice as many articles than the 3,000 strong professoriate of PUC and UCH, half of which work part-time, while another half or more do not have PhD degrees.

Budgets are perhaps the area of more similarity. UNICAMP is wealthier, but not by that much: while it exceeds PUC's expenditures by 70 percent, it is just 40 percent higher in this indicator than UCH.

Of course, one could slice data such as these in many different ways, and construct more sophisticated indicators, but there is no need for that to convey the basic message borne by these data. UNICAMP does not only have more of what counts more in research: it is a different *type* of university than either UCH or PUC. UNICAMP is a research university. And yet, its scientific prowess is not strong enough to get it above 300th place globally.

With these figures in mind, would it make sense for PUC or UCH to put stock in their showings in the ARWU or any other research-based ranking? Of course not. It would in any case make more sense for them to benchmark their numbers against a school such as UNICAMP, or some other university similarly positioned institution between themselves and the more research-intensive universities in the developed world.

But the fact remains that even achieving the level of research capacity and output of UNICAMP – an endeavour that may take the efforts of an entire generation of university leaders and policymakers in Chile – would not in all likelihood gain for PUC and UCH world-class stature.

WHAT WOULD IT TAKE FOR CHILE TO HAVE A WORLD-CLASS UNIVERSITY?

What it would take for Chile (or a country like Chile) to have a world-class university depends on the definition of world-class university. It might consist of having just one institution among the top 200 in the ARWU, and thus joining South Korea, Austria, Saudi Arabia, Singapore, and closer to home, Argentina, Mexico and Brazil, all of which have just one university among the top 200 (Table 2).

Table 2. Countries with only one university in the top 200 (ARWU 2013) and their share of world's GDP, compared to Chile's share of world's GDP (2012 data).

Country	*World's GDP (%)*
Brazil	3.11
Mexico	1.63
South Korea	1.56
Saudi Arabia	0.98
Argentina	0.66
Austria	0.54
Singapore	0.38
Chile	0.37

Source: World Bank, World Development Indicators.[1]

This is a very diverse set of countries, but almost all of them have in common an economy larger than Chile's. Singapore has an economy roughly the size of Chile's. So does Finland (not in the table), with not one but two universities in the top 200. The higher education systems of Finland and Singapore are, however, quite different from Chile's in several crucial dimensions that seem to have import for the viability of developing a world-class university.

First is the degree of fragmentation of possible candidates. There are 60 institutions in Chile chartered as universities (there are many more institutions in the non-university sector of higher education); the figure for Finland is 14, and for Singapore, 6 (not counting branch campuses of foreign universities). It should be easier to concentrate efforts and resources if these countries do not have to be spread as thinly as needed to support 60 institutions.

Second is funding: core public funding to Finnish universities covers about 64 percent of university budgets,[2] whereas in the case of the National University of Singapore, the one Singaporean university in the top 200 league, government grants constitute 58 percent of its operating budget (Mukherjee & Wong, 2011, p. 136). In Chile, by contrast, direct public appropriations account for an average of some 17 percent of budgets of the group of 25 universities which receive public subsidy.

Third is governance: while Chilean universities and Chile's national government sustain the rather absolute notion of university autonomy prevalent in Latin America (Bernasconi, 2008), ruling out central governmental planning and steering of higher education, the Finnish and the Singaporean governments do not refrain from setting a course for the higher education system, and from negotiating with each institution what its contribution will be to the common construction of that future.

To sum, what it would take for Chile to put one of its universities in the top 200 is doubling the size of its economy – and even that is no guarantee of success, as the cases of Spain and New Zealand, with no presence in the listing of the first 200, suggest – or failing that, a radical change in the policy environment for higher education, shifting from fragmentation to concentration, perhaps merging smaller institutions to form larger, more sustainable conglomerates; substantially expanding public investment in higher education so that the government begins to support excellence and not only access; and redefining university autonomy, so that it ceases to be understood as antithetical to governmental steering of the system towards strategic goals.

CONCLUSIONS

Research-based global university rankings, and the notion of a world-class (research) university, offer no direction to the strategic planning of Chilean universities, nor do they engage public policy in any form. There is no excellence initiative in Chile as those reported in the chapters in this book on Germany, Russia, Korea and China.

This is no oversight, but a reasonable stance for a higher education system still quite distant to the world-class target. Although Chile's researchers are the most productive in the region as measured by papers per capita or per dollar invested in R&D, the size of the research enterprise is still small, and wholly dependent on universities, with a very limited contribution from the private sector. Further expansion will require additional financial support from public and private sources, as well as an increase in the number of doctorate holders available as research personnel.

Does this mean that Chilean universities should ignore the idea of a world-class university? Not necessarily. The model, adapted to the set of functions and level of performance that could be reachable in, say, ten years, could be a useful aspiration for two or three universities in Chile.

This adapted model would recognize the central importance of undergraduate education, often not research-based, but nourished instead by practitioners' experience, as undergraduate programmes in Chile, as in Latin America generally, have a strong professional orientation. It would emphasize the relevance of knowledge transfer to the local community, alongside scientific discovery for its own sake. It would hold in high regard the academic values of excellence and the development of the talents within. It would streamline its governance structure and management capacities so that the university could actually change to improve. It

would allow interaction with the government, not as a threat to autonomy, but as an opportunity to agree upon a mutually acceptable course of strategic development, and it would be sufficiently funded so that the focus of concern shifts from survival to development.

Only on these terms would the quest for world-class distinction make sense in Chile, and possibly other middle-income nations, as a game that these countries can, and are willing, to play.

NOTES

[1] http://databank.worldbank.org/data/views/reports/tableview.aspx. Consulted April 21, 2014.
[2] http://www.minedu.fi/OPM/Koulutus/yliopistokoulutus/hallinto_ohjaus_ja_rahoitus/?lang=en, consulted April 19, 2014.

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12. WHAT MATTERS IN GLOBAL OUTREACH?

The Case of the University of Hong Kong

INTRODUCTION

While university presidents sometimes write books about their own universities, academics usually steer clear due to the risk of compromising their neutrality. The risk is more onerous in my case, due to being among the longest serving members of my University. Nevertheless, I have chosen to accept the invitation. I make no claim to neutrality, and I write with the assumption that the readership includes academics and institutional managers of universities in developing countries who are interested in what matters to a leading international research University that only several decades ago was a small undergraduate institution surrounded by a region with much poverty.

AGE MATTERS

When one examines the leading universities in the world, it becomes clear that age matters, especially in global outreach. Most leading research institutions have a history of over a hundred, and in some cases, several hundred years. Over such a long history, each has developed networks of research and scholarship, as well as a unique campus culture that has helped to sustain their greatness. In eastern Asia, specific policies in China, Japan, Korea and Malaysia have helped the ascent of their well-established research universities, including a few new universities. Less attention has been focused on how Asia's long established universities retain their resilience in the face of rapid economic globalization. The University of Hong Kong traversed several major stages in its 100 plus years of development (Cunich, 2012; Cunich, forthcoming). In the 21st Century, the University plays a key role in helping Hong Kong anchor globalization to ensure its long-term competitiveness as a major global city and special region of China.

As the University of Hong Kong entered its second century, it reframed its role as the nation's most international university with the grand challenge to advance knowledge within China's "one county – two systems" framework. This has meant increased collaboration with other national universities, and a deeper engagement with its historical role to support the modernization of the rest of the country. This also means addressing the most relevant problems facing the nation. Since national reunion in 1997, the University's academic staff has turned its research, teaching,

Y. Cheng et al. (eds.), How World-Class Universities Affect Global Higher Education, 163–175.

and knowledge exchange capabilities towards national renewal. While sustaining its Western academic heritage, it has recalibrated the balance in its global emphasis. It continues to interpret western knowledge traditions for China's development, while bringing more of the Chinese intellectual heritage into the international community. The University's position as a leading research university has come to rest more upon the integration of innovative teaching and research productivity through both cross-system and international collaboration. This is supported by a unique enabling environment among regional Asian universities of institutional autonomy, academic freedom and mobility, and multi-lingual/multicultural capability.

Its interdisciplinary curriculum and institutional arrangements must be able to support knowledge networks, and a pattern of "brain circulation" that ensures the recruitment and retention of internationally recognized scholars and scientists from China and around the world. The University has to manage three strategic balances: firstly, between indigenous and international academic leadership; secondly, recruitment intake from Hong Kong, the Chinese mainland, the Asian region and more globally; and finally research funding from local and national governments, as well as industry, alumni and other stakeholders.

For these and other reasons, the University was ranked first in Hong Kong, second in Asia, and 26th in the world by QS in 2013. Also that year, it was ranked first in Hong Kong, third in Asia, and 43rd in the world by the Times Higher Education World University Ranking (HKU, 2014a). The University is advantaged by its geographic position in a highly networked global city (Armour, 2013). By the turn of the 21st Century, its development hinged increasingly upon how it could drive innovation and provide a competitive edge for the nation and surrounding region (Dill & van Vught, 2010). Among its key resources are amphibious entrepreneurs – those administrators, academics, alumni and other stakeholders with extensive networks on multiple continents (Powell & Sandholtz, 2012).

HISTORICAL TRANSITION MATTERS

While Hong Kong's geographic position and strategic management of knowledge networks contribute to its having a high proportion of globally ranked research universities in one city, this was not the case 30 years ago when it was a low- to mid-level income economy, with only two universities that focused largely on undergraduate teaching.

In 1980, Hong Kong was ensconced within a region surrounded by a great deal of poverty. Only Japan had managed to upscale its economy to compete internationally. In Japan's wake, four smaller economies (Hong Kong, Singapore, South Korea, and Taiwan) began to forge ahead based on export trade and semi-skilled manufacturing. From the early 1980s (until the 1997 Asian economic crisis), those four Asian tigers posted impressive growth rates (Chen, 1979, 1983, 1994, 1997). With only a pair of universities, Hong Kong prospered through trade, re-export, small manufacturing enterprises, and financial services, backed up by an independent legal system (Youngson, 1982). Its economy remained relatively

unencumbered by government bureaucracy, and its civil service earned a reputation for having the highest level of integrity in the region (Burns, 2004). It also managed to rid itself of corruption, and it still remains unscathed by global terrorism (Lee, 1981).

As Hong Kong's economy continued to grow in the 1990s, it began to diverge from the other Asian tigers. Learning from Japan's success, the governments of the other three tigers (Singapore, South Korea and Taiwan) ratcheted up their high-tech industries, but Hong Kong continued to march to its governmental non-interventionist drummer and the invisible hand of the marketplace. Moreover, the tendency of Hong Kong investors to think in the short rather than long term led to an abbreviated vision for the development of high technology industry. Moreover, the government budget for R&D was, and remains, amongst the lowest in the world for an economy with average personal income levels that has rivalled some developing countries. In fact, allocation for R&D was 0.7 percent of GDP in 2010, placing Hong Kong in the 50th position in global rankings for this indicator (Ng & Poon, 2004; World Bank, 2012). Nevertheless, Hong Kong scientists are among the regional leaders in research performance (UNESCO, 2014).

Known for its entrepreneurial prowess, global trade, and competitive business practices, Hong Kong evolved to become a centre for the reception, translation and diffusion of knowledge. Under the Basic Law of the Hong Kong Special Administrative Region of China, the region is distinct from the Chinese mainland in many of its social, political and educational practices. Its universities remain deeply integrated into the global academy, while benefitting from the continued rise of the nation, including its economy and its research universities. Hong Kong's educational and academic exchange and mobility, official language policy of Chinese (Cantonese and Putonghua) and English, and communication infrastructure contribute to the international reception and dissemination of new scientific knowledge. Among its more recent challenges was to overcome the Asian economic crisis that began in 1997 and lingered through the 2003 SARS epidemic (So & Chan, 2002; Loh, 2004). The University played a major role in sequencing the genetic code in the fight against SARS (HKU, 2004).

It is imperative for research universities in a global city like Hong Kong to ensure that economic globalization works for, rather than against, research productivity and innovation (Albach & Salmi, 2011; Postiglione, 2011). With a scarcity of natural resources and manufacturing industries, the city is left to rely almost solely upon its human resources. Its school system produces one of the highest calibres of educational achievement in mathematics and science in the world (OECD, 2012). Its senior secondary schools and its universities have reformed their curriculum by adding a strong dose of liberal studies to encourage creativity, critical thinking and innovation. Meanwhile, the University is often noted for the heavy emphasis it places on performance measurement in the allocation of resources (Postiglione & Wang, 2011).

AN ENABLING ENVIRONMENT MATTERS

When the Chinese mainland initiated its policy of economic reform and opening up to the outside world in December of 1978, degree places in Hong Kong higher education only amounted to between one and two percent of the relevant age group. Throughout the 1980s, Hong Kong shared similarities with systems like Singapore in having an elite system of higher education with limited access to degree places. The low access rates were possible because the large English-medium school sector broadened student opportunities to enter university overseas. For the same reason, other Asian tiger economies like Korea and Taiwan which were without a large English-medium school sector, had to absorb more of the demand domestically for university education.

Since universities need a critical mass of undergraduates to establish viable graduate schools, the University did not gain traction as a research university until after 1989, when the government decided to double university enrolments in the wake of a large outflow of talent abroad. Soon after, the University of Hong Kong provided a greater range of graduate school qualifications. Its share of government funding was largely determined by the recommendations of the University Grants Council (UGC), composed of a group of local and international leaders in academia, business and society (UGC, 1996, 1999, 2002). The Research Grants Council (RGC) of the UGC provides advice and research funding that steer the format for the knowledge networks of research universities.

The University of Hong Kong's transition from an elite undergraduate institution to a world-class research university was set by 1990. Stakeholders in government, business, and higher education decided to support the rapid expansion of higher education. This acted as a confidence building measure as Hong Kong's capitalist system prepared to cross the river of post-colonialism under the umbrella of a socialist market economy of China. Other reasons played an equally important role, including rising aspirations for global excellence in higher education at a time when international development agencies, such as UNESCO and the World Bank, asserted that national development would increasingly hinge upon the capacity of universities to drive a knowledge economy, including in the area of advanced technology transfer (Task Force, 2000).

As Hong Kong's rise was accompanied by the expansion of higher education, its research universities were expected to help drive the economy and engage in knowledge exchange with the surrounding society. Significant for the University is its portal known as the Scholar Hub. This portal gives the community direct access to the work of academic staff and encourages partnership in knowledge exchange. It also serves as a portal linking the University to the national and global community (HKU, 2014b).

Other elements in the University's enabling environment are a high degree of internationalism, a highly valued but self-defined Chinese cultural heritage, multilingual adaptability, a capacity to attract talented scientists from around the world, communications technology that permits a close integration with the global academy, stern protection of academic freedom, a lively intellectual climate, its long-standing mission to promote the modernization of China, and the adjacent

mainland of China with its policy of economic reforms and opening to the outside world (Postiglione, 2006; Postiglione, 2007; Altbach & Postiglione, 2012).

While these basic conditions constitute an enabling environment, they alone do not drive research output and innovation. This is also determined by the government's macro-steering and the strategic management of the University. In simple terms, the government steers but the University has a high degree of autonomy. The University's research portfolio has the responsibility to attract and manage funds, persuade funding bodies, plan strategic research themes and areas of excellence, monitor and evaluate research and publications, disseminate and publicize (and sometimes commercialize) research breakthroughs, as well as provide research teams and their doctoral students with a supportive environment to increase academic research output and innovative science.

INSTITUTIONAL AUTONOMY MATTERS

Through the University Grants Committee (UGC) the government has leverage to steer the direction of the University of Hong Kong through prioritized funding and performance guidelines (UGC, 2004a). Yet, the University is autonomous under Hong Kong law. The University controls its curricula and standards, staff and student recruitment, research, and internal allocation of resources. The UGC, as a non-statutory body, can mediate between the University and government because it has the responsibility to ensure that tax payers' moneys are spent well. It offers advice to the University and receives advice from government. It is expected to take on a role in promoting quality, especially regarding international standards, through peer reviews and initiatives to monitor and enhance the academic standards. For example, it carries out a Research Assessment Exercises (RAE), the results of which are used to adjust the distribution of the research portion of the block grant to the University. In this way, it aims to hold the University accountable and drive improvements in its research output.

The decision to establish a Research Grants Council (RGC) in 1991 also played a role in the transition to a leading research University. The RGC provided a template for large scale research funding and further refined the global network of advisory services that steer the format for the management of the knowledge networks. The RGC made competitive research grants available to academic staff. As the primary source of research funds, RGC helped support the University of Hong Kong's definition of its strategic research themes (HKU, 2014c).

The international composition of its professoriate, governance committees, and members of the RGC are indicative of the commitment to building international knowledge networks. The members sometimes act as network brokers and conduits between the University, the international community and the rest of China. Though some of the members are local by residence, they are globally connected and act as amphibious entrepreneurs across a number of sectors, including international universities, business, and industry (Saskin, 2004).

STUDENT ENROLMENT, PROMOTING LEADERSHIP, AND GRADUATES EMPLOYMENT MATTER

Due in part to its long history and reputation in Asia, the University manages to attract the best students in the region. Of the nearly 71,000 undergraduate applications received in 2012, more than 23,800 came from outside of the Hong Kong school system. One in nine applications received an offer of admission. More than 6,800 of the 10,795 students enrolled in 2012-13 required a visa. Within Hong Kong, the University always attracts students with the best admission scores. However, it now attracts applications from international students and students from the Chinese mainland who have even higher academic standards than those students from Hong Kong secondary schools. This is significant as Hong Kong secondary school students are consistently ranked in the top three of the 60 countries in the Programme of International Student Evaluation (OECD, 2012).

The University received around 12,000 undergraduate applications in 2011-12 and 2012-13 from the Chinese mainland for a government-determined quota of only 300 places (Spinks & Wong, 2014; HKU, 2014a). In recent years, students enrolling in the University from the Chinese mainland were the top-scorers in their province and the country in the National College and University Entrance Examination. For this reason, the University has been referred to in the popular Western media as the Harvard of Asia and Oxbridge of East Asia (Times Higher Education, 2010; CNN, 2010). This can be attributed not only to the calibre of the students enrolled, but also to the prospects of graduates.

For example, Southeast Asia's rapid economic development has meant that more and more students are choosing to attend top regional universities, including the University of Hong Kong. In this way, they remain closer to the most vibrant labour market in the world. Employment levels are perhaps the highest in the world – graduates of the University have had a near 100 percent employment rate every year for the last seven consecutive years. The starting salaries of graduates were the highest in Hong Kong in 2012 and amongst the highest in the world (INGRADA, 2010). In the QS Asian University Rankings 2013, HKU achieved a score of 99.8 in the QS 'Employer Reputation' survey (HKU, 2014a). Since there are hundreds of multinational companies head-quartered in Hong Kong, due in part to the Chinese mainland's geographical proximity, the University developed a global hub for Asian industry and services. The recent Sea Turtle Index (Wall Street Journal, 2013) named Hong Kong as the third best city in the world for the return on investment gained by international students.

In short, the University must work to sustain Hong Kong as a viable global city. The University reflects this in the number of nationalities, approaching 100, represented on campus (86 nationalities in full-time programmes, and 92 nationalities if exchange and visiting students are included). These students are provided with an undergraduate curriculum and pedagogy that represent an integration of Western and Chinese academic traditions, paralleling the "East meets West" character of the city. Enquiry-based approaches are meant to align with the characteristic Asian dedication to study. A healthy competition amongst students for high grades straddles the University's experiential learning

curriculum. The extension of the undergraduate curriculum from three to four years in 2012 permitted the institutionalization of a core curriculum which gives students increased choices, echoing the characteristics of the North American system. The *Times Higher Education* remarked that it was "surprising that the University of Hong Kong is embarking on such wholesale reforms when it is already a member of the international elite with a reputation to maintain" (Times Higher Education, 2010).

Hong Kong's universities converted from a three- to a four-year undergraduate program to provide students with a broader knowledge base to support specialized learning, and with the skills and mindset to compete in a more globalized world. This unprecedented transformation has been surprisingly smooth. The relatively non-interventionist approach of the government, coupled with lively debate within the academy, have been essential aids to the process. The University recognizes that promoting leadership for China and the region through experiential learning can help adapt and strengthen the role that it has taken for a hundred years. This also aligns with the vision of the University Grants Committee for students and academic staff (UGC, 2004b):

> We need home-grown graduates who have a strong sense of belonging, and a strong sense of identity as being a part of Hong Kong. At the same time it is also important to nurture a core of local faculty who give stability, local character, and cultural and intellectual rootedness to local universities, and engage themselves heavily with the local community. Their social and public role is vital to the development of a civil society and the quality of life.

THE PROFESSORIATE MATTERS

More than half of the professoriate come from outside of Hong Kong, and most are recruited with advanced degrees from overseas universities in Europe, Australia, and North America. This has helped ensure that knowledge networks remain unencumbered (Saxenian, 2005). The regular full-time professoriate, numbering 1,052 (94 percent with doctorates), ensure the University's position as Hong Kong's leading institution (UGC, 2014). They have the highest number of winning research proposals, and the largest amount of research funding. The University has the highest number of refereed publications, highest number of refereed publications per academic, the highest number of refereed journal articles published in journals tracked by Thomson Reuters, and the highest number of citations tracked by Thomson Reuters. 125 of its professorial staff have been ranked by Thomson Reuters as being among the world's top 1 percent of scientists, based on the number of citations recorded for their publications in 2013 (HKU, 2014a). The level of scholarship at the University is reflected in that of its last president, a world-renowned geneticist, and its current president, who leads one of UK's distinguished medical schools.

The University's template for the exchange of ideas in research and innovation has to evolve in alignment with policies and practices in the larger global academy. The academic organization and administration of the University are under

continual review. Top-slicing of the university budget is reallocated to support initiatives and incentives that aim to strengthen research capacity, including ways to better manage research networks and academic output. For example, the University has five strategic research areas comprising 16 strategic research themes and five emerging themes viewed as critical to the advancement of Hong Kong, the Chinese mainland and the rest of the world. The five strategic research areas are community, biomedicine, environment, frontier technology and China. Funding comes from the University, and other sources including the Areas of Excellence (UGC), Theme-based Research Scheme (RGC), and partnering with the State Key Laboratories, and the National Key Basic Research Development Program on the Chinese mainland (HKU, 2014d).

The University is as closely linked with its national and international counterparts as with other universities in Hong Kong. The high velocity of brain circulation provides the University with the capacity to facilitate cross-border and international research collaborations. The template of institutional arrangements, network agents, and brain circulation for anchoring globalization and national development facilitates a large amount of research collaboration by the professoriate. The level of research collaboration has significantly risen in the past two decades according to surveys of the academic profession by the Carnegie Foundation for the Advancement of Teaching and the Changing Academic Profession project (Boyer, Altbach, & Whitelaw, 1994; Postiglione, 1997; ISCAP, 2007; Postiglione & Wang, 2011).

By 2007 most of the professoriate were engaged in collaborative research. The most productive 20 percent of academics were even more involved in internationally collaborative research. In fact, the University's professoriate remains more internationally collaborative in research than most of its Asian counterparts. Research collaboration in the postcolonial era retained the traditional networks of collaboration with Anglo-Western countries but became augmented by newer patterns of collaboration, not only with academics on the Chinese mainland, but also with counterparts in many other parts of the world, such as Eastern and Southern Asia, Africa and Latin America.

The University's high degree of international research collaboration is unsurprising because the professoriate is highly international by citizenship. About 70 percent of those with doctoral qualifications earned them overseas, usually at a university in the United Kingdom, North America, or Australia. Recruitment is based on qualification and need, not nationality. The University has shifted its emphasis from recruiting renowned professors to recruiting young scholars for long-term sustainable development.

In summary, the University's professoriate has a high degree of engagement in regional and international research cooperation. Recruitment of academic staff is internationally competitive. Institutional management provides opportunity for short- and long-term visits by distinguished scholars and scientists, including Nobel laureates and other highly recognized scholars and scientists. Institutional management facilitates academic productivity by providing advantages for

building international knowledge networks and for publishing research findings overseas.

All academic members of staff are rigorously assessed each year on the basis of the University's internal web-based template of performance indicators. Despite the sometimes bureaucratic nature of the annual performance review, the professoriate tends to agree that decisions about personnel and allocation of resources are made more objectively than might otherwise be the case. While there can be a downside to the rising culture of academic assessment, appraisal, and evaluation in universities around the world, the University has been able to absorb the criticisms. Performance measures have been found to increases stress on Hong Kong academics. However, these also appear to coincide with relatively high levels of job satisfaction, due in part to the view that institutional decisions are viewed as relatively fair and less politicized (Postiglione & Wang, 2011).

INSTITUTIONAL HERITAGE WITHIN THE NATION MATTERS

The University of Hong Kong continues to reconfigure its long-standing institutional heritage with its key role as a University of and for China. The process becomes pivotal as leading research universities on the Chinese mainland deepen their level of internationalization. There is a reflective discourse about how to bring the University's Western academic model into the service of China. One Hong Kong scholar made reference to this: "Will Asia be just producing more of the same of the Western-originated contemporary higher education model, or will it be able to unleash a more critical understanding and practice in higher education, a cultural and epistemological reflection on the role of universities as venues of higher learning" (Cheung, 2013). This has become more important as the Chinese mainland continues to consider what kind of higher education system is best for its future. Beyond the race to excel on international indicators of university success is the longstanding issue of how to strengthen the nation in the face of historic humiliations and foreign exploitation. China has finally learned how to effectively borrow, not copy, from the West without muting the influence of its ancient culture. More attention is being focused on how higher education can be guided by China's own unique heritage ideas and principles. It is common to credit the towering figures of the classical era, such as Confucius and Mencius, Sunzi and Mozi, and later Wang Yangming and Zhu Xi, for shaping educational ideas. In the modern era, Hu Shi is well known, but others, such as Cai Yuanpei, Liang Shuming, Ye Yangchu, Mei Yiqi, Jiang Bailing, Yan Fu, Tao Xingzhi, and Pan Guangdan, were also influential educational thinkers. There is an ongoing concern that university education has not been sufficiently shaped by indigenous ideas and academic traditions dating back to the Song and Tang Dynasties.

Research co-operation with counterparts on the Chinese mainland has risen sharply in all fields. However, this is especially true in areas related to science and technology, where the conditions and environment for research collaboration have improved. Increased cooperation with scientists on the Chinese mainland also provides another major source of research funding to offset the current level of

funding for R&D in Hong Kong (0.7 percent of GDP). On a 2012 visit to Hong Kong, the President of the Chinese Academy of Sciences associated Hong Kong scientists with the Chinese mainland's need to propel scientific discovery. In fact, China now spends more than any other country in Asia on research and development. It increased the proportion of its GDP for research and development from 0.95 percent in 2001 to 1.84 percent in 2011. It devoted 1.98 percent of its GDP to science and technology in 2012 (a 7.6 percent increase from 2011). Its Five Year Plan calls for an expenditure to 2.2 percent of GDP for research and development by 2015, (which will put it above the 28 member states of the European Union) (SCMP, 2014).

The door has opened to increased research funding for scientists of the University at partnering state laboratories (HKU, 2014e). In the adjoining region of Guangdong province, there are seven strategic areas for cooperative research with University scientists: energy saving and environmental protection (clean energy technology); next generation IT (modernization of the country's telecommunications infrastructure); bio-technology (pharmaceutical and vaccine manufacturers); high end equipment (aircraft, satellites, manufacturing technology); new energy (nuclear, wind, solar); new materials (rare earths); and new energy cars (electric and hybrid cars, batteries).

The University has signed a partnership agreement with China Bio-Med Regeneration Technology to study how stem cell can slow down the aging process. It has established the University of Hong Kong-Zhejiang Institute of Research and Innovation, and has also partnered with Zhejiang University and Tsinghua University on research related to infectious disease treatment. It also cooperates on research outside the fields of science and technology. For example, the University has a partnership with Tsinghua University Law School to promote exchanges that foster judicial development and groom legal talents for the Chinese mainland. The Faculty of Education co-operated with the Gansu Education Commission and Northwest Normal University in three areas: experiential learning for undergraduate students of the University in ethnic minority regions, the training of multiple cohorts of Gansu's rural school principals, and research on obstacles to university access among Gansu students from impoverished areas.

In short, the University has become locally integrated, nationally engaged, and regionally positioned for global impact in teaching and research. The focus is increasingly on fields and specialties that address national growth challenges. Governance of the University is meant to support an organization that is innovative and unique, that promotes a sense of ownership among academic staff, that protects the academic research atmosphere, and that is international without assaulting the University's heritage. As the geneticist who led the University through its centenary noted: "The University's tradition has been carried on for more than 100 years … there have been small changes here and there, but the overall template, like DNA, stays the same."

AN INTEGRATED PROCESS MODEL MATTERS

The University of Hong Kong model anchors globalization by capitalizing on its century of heritage with the Western academic model, its strategic positioning as the leading international university of China, and its ability to attract the top students and scholars from all over the world. This model is best viewed as a product of a long-term process that has required the University to recognize opportunities and take calculated risks in planning and implementation at different phases of its development.

The model rests on an enabling environment of institutional arrangements, deft engagement with international brain circulation, and amphibious stakeholders in the community who have the agility to bridge academia, industry and government. Above all else, the model is one that places an emphasis on the establishment, protection, and elaboration of collaborative knowledge networks and academic freedom. That means a model in which the university takes strategic advantage of its capacity to make globalization work for China's continued rise and growing international leadership in economic development, science and technology. Its location in one of the world's major cosmopolitan centres gives the University open access to international knowledge networks that helps address national challenges.

Looking ahead, the dynamic economy of East Asia will probably continue to be an asset in favour of the University of Hong Kong's long established international reputation as a leading research university in China with global outreach. That global outreach hinges on a sustained broadening of international knowledge networks. In the longer term, its future will depend on how it positions itself during its second hundred years, within a region of the world that will be the major driver of the global economy by 2050.

ACKNOWLEDGEMENTS

Thanks to John Bacon-Shone, Steve Cannon, Paul Cheung, Roland Chin, Peter Cunich, David Lung, John Spinks, and Li-fang Zhang.

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13. GLOBAL COMPETITION AMONG RESEARCH UNIVERSITIES

INTRODUCTION

A role of higher education in the fabric of societies has changed dramatically in recent years as internationalization has become an important influence. Research universities today are not only national organizations but increasingly international entities.

In an increasingly networked global economy (Manuel, 1996), knowledge is positioned as the foundation of economic, social and political power (Johnstone, 2010, p. 19; Hazelkorn, 2011, p. 6) and thus nations are increasingly dependent upon brainpower (Ben, 2010, p. 5). This places universities in a key role in creating new knowledge for economic growth, and in educating people who have the intellectual breadth and critical thinking skills to innovate and lead (Levin, 2010, p. 66).

In the past colleges and universities competed nationally but today many of them compete globally. As a result, universities become disembedded from the national context (Burnett & Huisman, 2010, p.118) and governments have less control over individual institutions (Maginson, 2008). The national role of universities may be reduced in favour of the international (Deem, Rosemary, Mok, & Lucas, 2008, p. 91). At the same time, universities themselves have less sovereignty over their own activities because of the influence of global forces (Marginson & van der Wende, 2007, p. 17).

The world-class university phenomenon is an outgrowth of international competition among research-intensive universities. As Altbach states, "No one knows what a world-class university is, and no one has figured out how to get one" (Altbach, 2004, p. 20). The creation of international university rankings have led to what some observers consider an academic arms race (Dill & Soo, 2005, p. 523) since rankings create a zero-sum game of prestige. Many of these rankings valorize research in the sciences and thus create a single model of excellence (Nelson & Sauder, 2007, p. 3). Rauhvargars cautions that policymakers are "tempted to judge all higher education in the world by the standards that rankings use to detect the top *research* universities, rather than applying one of the core principles of quality assurance – the 'fitness for purpose' principle" (Andrejs, 2011, pp. 13). Globalization subjects all higher education institutions to the pressure of an unequal global knowledge system dominated by the wealthy universities and

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imposes the norms and values of those institutions upon all (Altbach & Balan, 2007, p. 17).

RESEARCH QUESTIONS

This may be the only data set comparing 21 universities in Asia, Australia, Europe, and North America. Unlike most studies of world-class universities or policy initiatives motivated by increased globalization, this research project takes the individual university as the unit of analysis. Thus it enables exploration of questions dealing with institutional responses to national policy initiatives and to international trends in higher education.

Among the research questions addressed in this chapter are:

- What has been the impact of national investment in universities in terms of research funding and productivity/publications? Has the priority on research by ranking systems driven an emphasis on publications in comparison to other academic activities?
- Is the investment in research producing high quality results?
- Are newer universities, mostly in Asia, catching up with more established universities in Europe and North America in terms of publications and prestige?
- Can all of these 21 universities realistically seek to be world-class universities? Should national policymakers and campus leaders moderate their aspirations?

METHODOLOGY

This project compares 21 research-intensive universities, taking the institution as the unit of analysis:

Mainland China

- Peking University
- Tsinghua University
- Sichuan University
- Tianjin University
- Beijing Normal University

Japan

- Tokyo University
- Kyoto University
- Tohoku University

Australia

- Australian National University
- University of Sydney

Hong Kong

– Chinese University of Hong Kong
– Hong Kong University

Other Asia

– National Taiwan University
– National University of Singapore
– Korea University

Europe

– University of Oxford
– Swiss Federal Institute of Technology Zurich (ETH)
– Pierre and Marie Curie University (Paris 06)

United States

– Massachusetts Institute of Technology
– University of California, Berkeley
– University of Michigan, Ann Arbor

Institutional statistics were gathered on staffing, budgets, research expenditures, rankings, and publications in 2003, 2007 and 2010 (Mohrman, 2013, pp. 727-743).[1] Sources include university websites, relevant government resources, the ISI Web of Knowledge[2] and personal interviews. The year 2003 was chosen for two reasons: it represents the first published international university ranking system, the Academic Ranking of World Universities, created by Shanghai Jiao Tong University. It is also the end of Phase 1 of the 985 Project, a huge supplemental funding stream for an elite group of 39 Chinese universities with the potential to achieve international distinction. The period 2003-2010 should provide evidence of Chinese institutional responses to governmental priority on creating world-class universities. Some of the other universities in the study have similar pressure from their national governments, accelerating the general trend toward greater research intensity at large comprehensive universities.

WEALTH

While money alone does not make a university internationally competitive, it certainly helps. As Figure 1 shows, the percentage increase in total university expenditures between 2003 and 2010 was dramatic in the five Chinese universities, ranging from 118 percent at Beijing Normal University to almost 200 percent at Tsinghua. Clearly the investments by the national government have been significant. The only other institution that comes even close is Oxford which nearly doubled its budget in the same period.

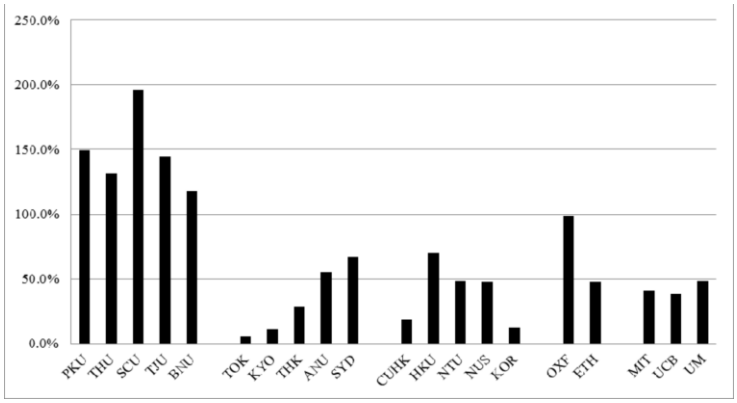

Figure 1. Percentage increase in total university expenditures, 2003-2010.

Figure 2 (and most of the subsequent charts) takes financial data and normalizes them to US dollars using the World Bank's Purchasing Power Parity methodology (World Bank, 2008, 2010). Then, given the size differences among the 21 universities, it compares expenditures on a per professor plus researcher basis. Because universities organize their teaching and research staff in various ways, this project combines the two academic categories to make the statistics comparable.

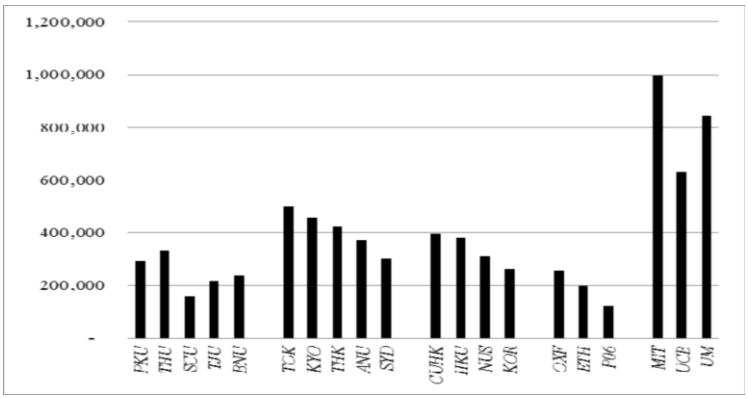

Figure 2. Total university expenditures per professor plus researcher, in US dollars using PPP, 2010.

International comparisons are tricky, since different countries have different economic systems and academic institutions are funded differently, even in the same nation. The two efforts to make statistics reasonably comparable (Purchasing Power Parity and per capita analysis) definitely help, but small variations should not be considered significant. Large variations, however, such as the differences in

Figure 1, are relevant. They represent differences in funding policies by various governments as well as the availability of external resources, such as research grants from business enterprises, for example.

Figure 1 shows change over time, but in some cases the institutions with the largest increases started from a relatively low base. Figure 2 presents total university expenditures normalized via PPP and per professor plus researcher calculations. It is no surprise that the three American universities in the sample have the largest budgets. It is surprising, however, to see that ten of the Asian/Australian universities have significantly larger budgets per capita than Oxford!

RESEARCH EXPENDITURES

While global competition and competitiveness can be measured in many ways, the prevailing standard is research output. International rankings always include a measure of publications; individual scholars seek to build their international reputations through published research results in international journals.

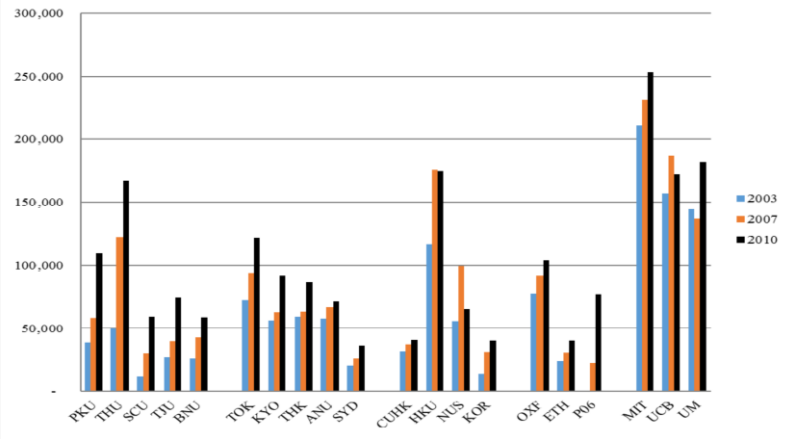

Figure 3. Research expenditures per professor plus researcher, in U.S. dollars, using PPP, 2003, 2007, and 2010.

Research expenditures increased between 2003 and 2010 at all the institutions in this sample, and in the case of Sichuan, the expenditure on research more than quadrupled, as shown in Figure 3. In a few cases, such as National University of Singapore, the number of professors and academic researchers also increased, and at a rate greater than the growth of research expenditures (and so the per capita amount in 2010 is lower than it was in 2007, even though the absolute value of investment in research was higher in 2010 than in 2007).

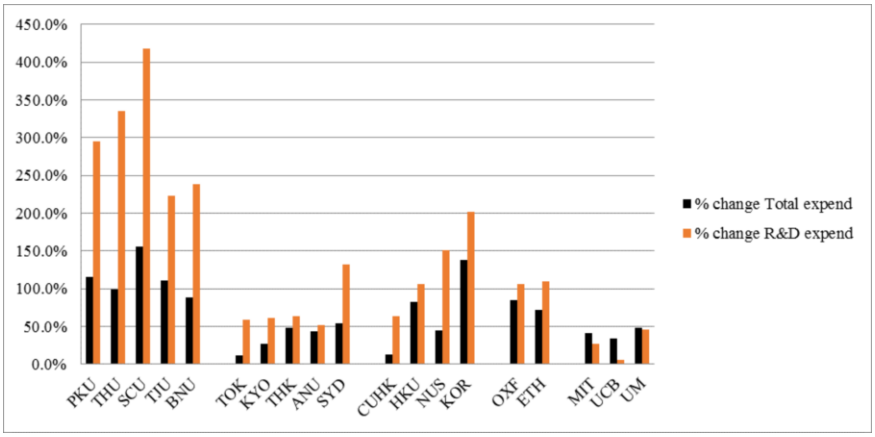

Figure 4. Percentage change in total university expenditures and R&D expenditures between 2003 and 2010.

Figure 4 responds to the question: Are total expenditures and research expenditures growing at the same rate? The answer is no. In 19 of the 21 universities in the sample, research expenditures have increased at a faster rate than the overall university budget, in some cases dramatically faster. (The exceptions, the three American universities, probably reflect the downturn in federal government funding after the global recession in 2008.) Once again, Asian universities had the greatest increase in research funding, albeit from a low base in some instances.

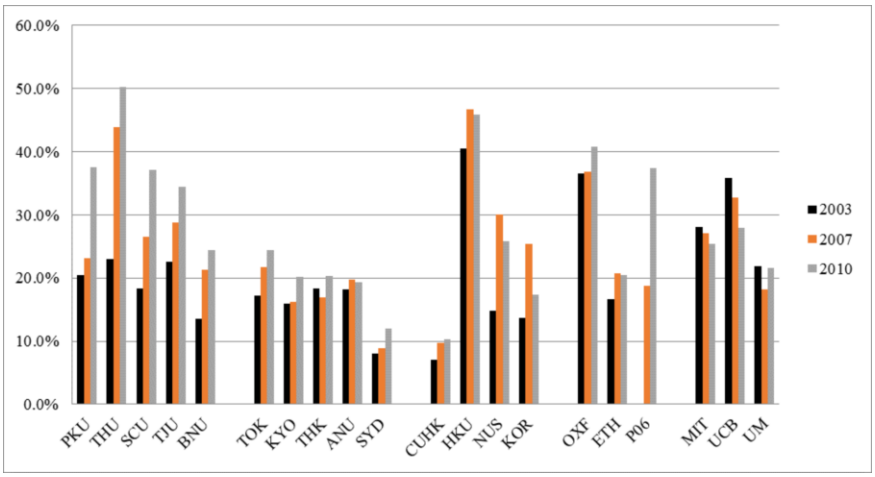

Figure 5. Percentage of total university expenditures on research, 2003, 2007, and 2010.

Figure 5 is another way of demonstrating the same phenomenon by presenting the percentage of the total university budget devoted to research. All five Chinese universities, as well as Hong Kong, Korea, Oxford, and Pierre and Marie Curie (P06), spend a larger proportion of their budgets on research than do the American institutions. This analysis suggests that the international competition in research will increase; American universities may not be as competitive in the future as they have been in the past.

PUBLICATIONS

A second way to estimate research intensity is to look at publications in highly regarded journals. This project uses the total number of journal articles indexed in the ISI Web of Knowledge (Thomson Reuters) as an indicator of good-quality research. As Figure 6 shows, all 21 universities increased the number of publications by faculty and researchers between 2003 and 2010, with a number of Asian universities presenting the greatest percentage increase in per capita publications, led by National Taiwan at 309 percent! The implication of the statistics in Figure 7 is that universities without a long tradition of published research, primarily in Asia, have dramatically ramped up their priority on publications. It is open to debate whether this change is directly linked to the emphasis on publications in the leading ranking systems, but a number of studies have suggested that universities, eager to raise their international reputation, have pushed hard for greater research output by their faculties.

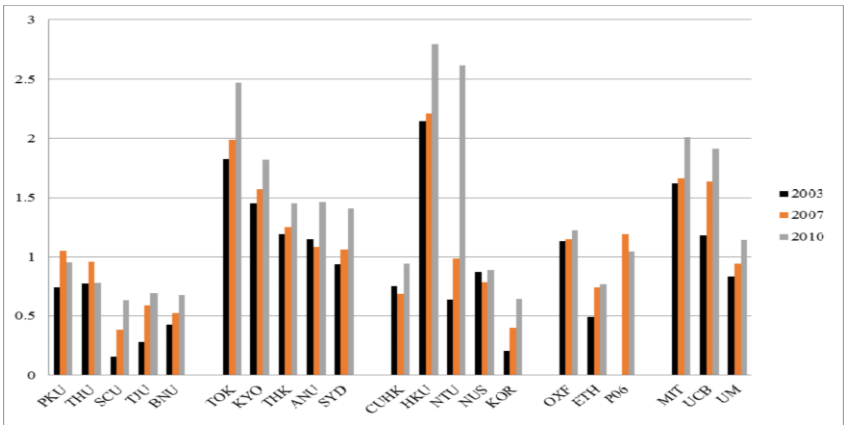

Figure 6. Indexed publications per professor plus researcher, 2003, 2007, and 2010.

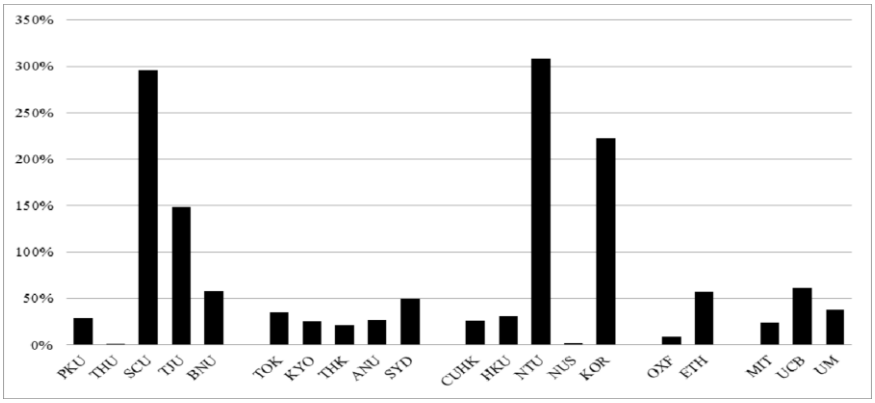

Figure 7. Percentage increase in indexed publications per professor plus researcher, 2003 to 2010.

Table 1. Academic Ranking of World Universities (ARWU) 2003, 2007, 2010, and 2013.

	2003	*2007*	*2010*	*2013*
PKU	251-300	203-304	151-200	151-200
THU	201-250	151-202	151-200	151-200
SCU	Not incl.	Not incl	301-400	301-400
TJU	Not incl.	403-510	401-500	401-500
BNU	Not incl.	Not incl	Not incl.	301-400
TOK	19	20	20	21
KYO	30	22	24	26
THK	64	76	84	101-150
ANU	49	57	59	66
SYD	102-151	102-150	92	97
CUHK	301-350	203-304	151-200	151-200
HKU	251-300	203-304	201-300	201-300
NTU	152-200	151-202	101-150	101-150
NUS	102-151	102-150	101-150	101-150
KOR	401-450	305-402	201-300	301-400
OXF	9	10	10	10
ETH	25	27	23	20
P06	65	39	39	37
MIT	6	5	4	4
UCB	4	3	2	3
UM	21	21	22	23

Has the motivation for higher position in the rankings been borne out? Yes it has in most cases. Table 1 lists the position of the 21 universities in the ARWU rankings conducted by Shanghai Jiao Tong University in 2003, 2007, 2010, and 2013. While small changes in rank from year to year are probably insignificant, big shifts in relative position are worth noting.

All five of the Chinese universities have made improvements in their position in the ARWU ranking, in some cases from not being included in 2003 to being ranked somewhere in the middle of the 500 institutions listed. Paris 06 (Pierre and Marie Curie University) has moved from 65th to 37th between 2003 and 2013. Interestingly, National Taiwan, the university with the greatest percentage increase in publications per capita, has not yet made a dramatic shift in relative position internationally.

Tohoku University presents a puzzle. While its publication output has increased modestly, its relative position has steadily declined over the last decade. Perhaps the aggressive policies of other institutions worldwide have pushed less ambitious universities lower in relative position.

IMPACT OF RESEARCH PUBLICATIONS

The Centre for Science and Technology Studies at Leiden University in the Netherlands has developed a rigorous ranking system based on publications in Thomson Reuters' Web of Science database in the period 2008-2011. Book publications, publications in conference proceedings, and publications in journals not indexed in the Web of Science database are not included. Only publications of the Web of Science document types *article* and *review* are considered in the Leiden Ranking.

The Leiden Ranking has several indicators for impact of scholarly research, but the one the organizers feel is most important is *PP:* The proportion of the publications of a university that, compared with other publications in the same field and in the same year, belong to the top 10 percent most frequently cited.

This Leiden impact factor provides a useful means of comparing the quality of academic publications, not just the quantity. Figure 8 presents a chart comparing the number of indexed publications per capita with the Leiden impact factor for each of the 21 universities in the study.

The clusters represent different results, perhaps different institutional strategies, with regard to faculty publications. National Taiwan, Tokyo, and Hong Kong Universities clearly have the most prolific scholars with somewhere between 2.5 and 3.0 indexed publications per capita. Fairly recent entrants to academic publishing (Sichuan, Korea, Tianjin and Beijing Normal) are low in both numbers of publications and in impact, while somewhat more experienced universities (Chinese University of Hong Kong, Peking, Tsinghua, and National University of Singapore) are slightly higher in both numbers and impact. It is interesting to note, however, that the most prolific universities in the green circle (Kyoto, Tohoku, Sydney and Australian National University) are lower in impact than the less

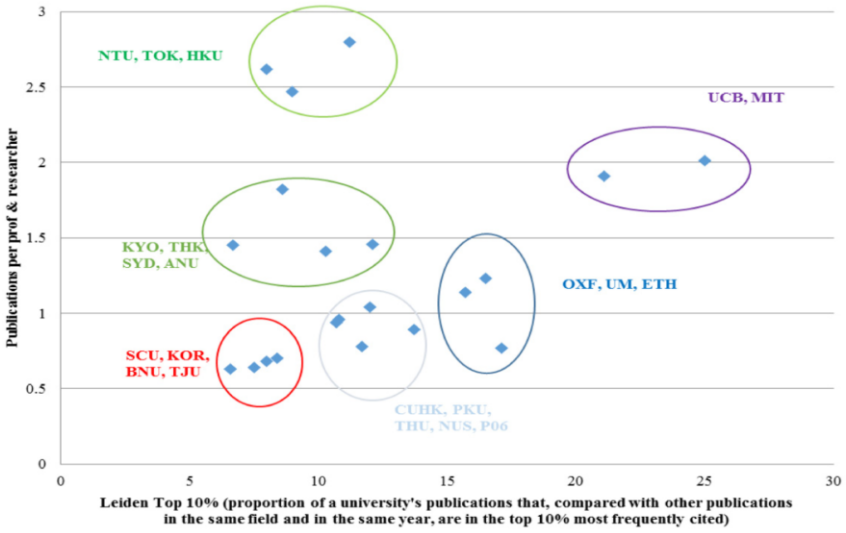

Figure 8. 2010 indexed publications per professor plus researcher, compared to Leiden impact factor.

prestigious institutions in the light blue circle (Chinese University of Hong Kong, Peking, Tsinghua and National University of Singapore). This suggests that strategy of lots of published articles (which raises a university's publication score in the ARWU rankings) does not necessarily bring scholarly recognition to the university in terms of citations.

It is no surprise that the European and American universities are the highest in impact, with MIT topping the Leiden rankings as the institution with the largest proportion of faculty publications cited by others, at 25 percent. Of course, there is the possibility of a "halo effect" in which authors prefer to cite scholars at the most prestigious institutions, giving the advantage to well-known Western scholars. The relatively low Leiden scores to most Asian universities, however, suggests that research expenditures today may not show results for many years to come.

VALUE FOR RESEARCH INVESTMENT

Another measure of effectiveness is research expenditures compared with the total number of indexed articles – in other words, are funders getting their money's worth? Figure 9 presents a calculation of research expenditures per indexed article, compared with the number of publications per capita. This is a crude measure, to be sure, but it shows significant differences among the 21 institutions.

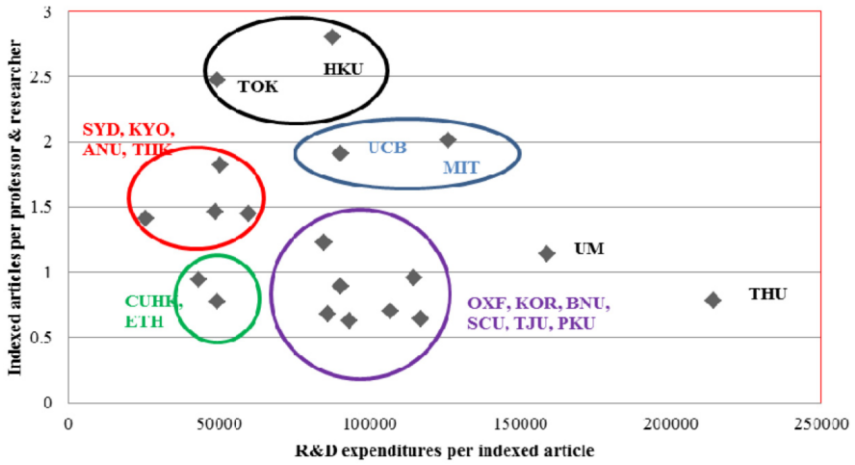

Figure 9. Indexed articles per professor plus researcher, and R&D expenditures per indexed article, 2010.

A number of the Asian and Australian universities have relatively low research expenditures per article and low to moderate publication rates, a result that seems intuitively correct. Universities that do not spend a great deal on research produce fewer scholarly publications.

The more interesting institutions are the outliers. Tokyo and Hong Kong, the two most prolific of the universities in the sample, show relatively low research expenditures per article (in part, perhaps, because they produce so many publications). MIT strikes a balance between research productivity and research expenditures in achieving its position as the institution with the highest impact factor.

Perhaps the biggest surprise is Tsinghua. Its productivity per professor plus researcher is relatively low, yet its research expenditures are very high, by far the highest in the sample. One might argue that Tsinghua, as a technologically-oriented institution, naturally has higher expenditures than a comprehensive university, but there are other technologically-oriented institutions in the sample. Another argument could be the fact that Chinese universities may still be in the start-up phase of big research, while American and European institutions have been conducting such research for many decades. Chinese universities could be spending more of their money on long-term fundamental research rather than short-term projects, although the national policy emphasis on economic development suggests a priority on applied research instead. Or Tsinghua may be spending more money simply because it has more money.

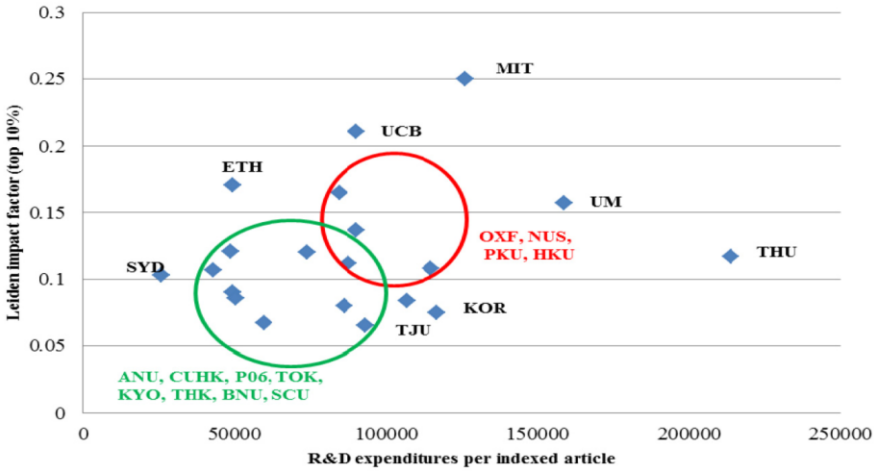

Figure 10. Research expenditures per indexed article 2010, and Leiden impact factor 2013.

A final comparison is the Leiden impact factor compared with research expenditures per indexed article (Figure 10). A number of universities cluster at the bottom left of the chart, where low impact and low expenditures coincide. Once again the outliers are the most interesting. ETH has a higher impact factor while spending about one-third as much per article as does Michigan. To be fair, Michigan has a large medical school while ETH does not – but still the difference is striking.

Berkeley has the second highest impact factor of the sample, yet a relatively moderate cost per article. Tsinghua continues to be notable for its relatively low impact factor yet the highest cost per article of the sample. One might draw the conclusion that money matters, but money alone will not produce consistently high scholarly results.

CONCLUSION

National governments and individual research universities have frequently declared "world-class status" as their policy goal. Rightly or wrongly, they are following the lead of European and North American universities, shifting their frame of reference from national to international (Yang & Welch, 2012). Being globally competitive means more than high rankings, but the development of international league tables has provided new ammunition in the battle for worldwide excellence (Hazelkorn, 2011, p. 4).

For the 21 universities in this study, the direction of causation is not always clear: Do rankings cause the higher priority placed on research? Do individual scholars seek greater prestige through publications in refereed journals? Do governmental priorities on economic and social development drive applied

research, especially in science and technology? Probably all of these factors are germane.

Thoughtful scholars have observed that rankings can influence institutions to change their behavior in response to being evaluated. Espeland and Cauder note that rankings encourage schools to become more like what the rankings measure, with institutional responses including redistribution of resources, redefinition of work, and gaming the system (Esperland & Cauder, 2007, p. 24). Hazelkorn reports that, of 151 university faculty and administrators she surveyed, only three individuals reported no action in response to rankings (Hazelkorn, 2007, p. 98). Deem, Mok and Lucas call for careful reflection on the extent to which "good practices" from Europe and North America can be successfully integrated into non-Western systems. Will competition in a system based on science-oriented universities in the West lead to a new dependency culture reinforced by American-dominated hegemony (Deem, Mok, & Lucas, 2008, p. 92)?

Marginson notes that most of the ranking systems emphasize number of publications as a proxy for academic quality. In questioning the effects of global comparisons, he muses about the implications for intellectual creativity.

> One danger is that an emphasis on maximizing the volume of high quality work, so as to augment the position in citation metrics and rankings, may drive a higher proportion of inquiry down more predictable and less risky intellectual pathways. Perhaps scholars and researchers are more likely than before to work to the academic opinion market and less likely to overturn received wisdom. (Maginson, 2008, p. 15)

This research project is not intended to examine the riskiness of research in any of the 21 universities, although Marginson's caution seems valid. What this chapter does demonstrate is:

- Universities in a number of countries on different continents all are increasing their investments in research at a rate higher than the overall growth in university budgets.
- The five Chinese universities in this study have all experienced more than 100 percent increases in their total budgets from 2003 to 2010, with Tsinghua having an almost 200 percent increase during this period. These same institutions have all increased their research expenditures by more than 200 percent, with Sichuan University exceeding 400 percent between 2003 and 2010.
- Publications in journals indexed by the ISI Web of Knowledge have also increased in all 21 universities in this sample, with the increase at Sichuan, Korea, and Tianjin Universities ranging from 326 percent to 186 percent.
- Many of these universities, but not all, have improved their relative position in the Academic Ranking of World Universities, in part because of their increased number of publications.
- The Leiden impact factor is larger for European and American universities (no surprise there) but the impact factor is not directly related to the number of publications. In fact, the three universities with the largest number of indexed

articles per capita have among the lowest impact factors of the sample. This finding suggests that universities might raise their reputations more successfully with an emphasis on quality rather than sheer numbers of publications by their professors.

– Research expenditures alone do not produce positive results. While lower expenditure per article correlates with lower impact factor, the reverse is not always true. The institutions with the highest expenditures per article do not always have the highest impact factor. This finding suggests that simply increasing the money available for research will not necessarily produce more scholarly articles or more academic influence as measured by the Leiden impact factor.

NOTES

[1] An earlier version of this research, looking only at 2003 and 2007, is Mohrman, K. (2013). Are Chinese universities globally competitive? *China Quarterly, 215*(September), 727-743.

[2] http://isiknowledge.com/.

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