



**Research,
Development,
and Innovation in
Asia Pacific
Higher Education**

Edited by
John N. Hawkins
& Ka Ho Mok



International and Development Education

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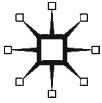
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HIGHER EDUCATION

EDITED BY
JOHN N. HAWKINS AND KA HO MOK

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Series Editors' Introduction

We are pleased to introduce another volume in the Palgrave Macmillan International and Development Education book series. In conceptualizing this series we took into account the extraordinary increase in the scope and depth of research on education in a global and international context. The range of topics and issues being addressed by scholars worldwide is enormous and clearly reflects the growing expansion and quality of research being conducted on comparative, international, and development education (CIDE) topics. Our goal is to cast a wide net for the most innovative and novel manuscripts, both single-authored and edited volumes, without constraints as to the level of education, geographic region, or methodology (whether disciplinary or interdisciplinary). In the process, we have also developed two subseries as part of the main series: one is cosponsored by the East-West Center in Honolulu, Hawaii, drawing from their distinguished programs, the International Forum on Education 2020 (IFE 2020) and the Asian Pacific Higher Education Research Partnership (APHERP); and the other is a publication partnership with the Higher Education Special Interest Group of the Comparative and International Education Society that highlights trends and themes on international higher education.

The issues that will be highlighted in this series are those focused on capacity, access, and equity, three interrelated topics that are central to educational transformation as it appears today around the world. There are many paradoxes and asymmetries surrounding these issues, which include problems of both excess capacity and deficits, wide access to facilities as well as severe restrictions, and all the complexities that are included in the equity debate. Closely related to this critical triumvirate is the overarching concern with quality assurance, accountability, and assessment. As educational systems have expanded, so have the needs and demands for quality assessment, with implications for accreditation and accountability. Intergroup relations, multiculturalism, and gender issues comprise another cluster of concerns facing most educational systems in differential ways when one looks at the change in educational systems in an international context. Diversified notions of the structure of knowledge and curriculum

development occupy another important niche in educational change at both the precollegiate and collegiate levels. Finally, how systems are managed and governed are key policy issues for educational policy makers worldwide. These and other key elements of the education and social change environment have guided this series and have been reflected in the books that have already appeared and those that will appear in the future. We welcome proposals on these and other topics from as wide a range of scholars and practitioners as possible. We believe that the world of educational change is dynamic, and our goal is to reflect the very best work being done in these and other areas. This volume edited by John N. Hawkins and Ka Ho Mok, on the topic Research, Development, and Innovation in Asia Pacific Higher Education clearly meets the standards and goals of this series and we are proud to add it to our list of publications.

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Acronyms and Abbreviations

AAC&U	Association of American Colleges and Universities
AACC	American Association of Community Colleges
ABET	Accreditation Board for Engineering and Technology
ACECQA	Australian Children's Education and Care Quality Authority
ACT	American College Testing
AIG	Australian Industry Group
AITSL	Australian Institute for Teaching and School Leadership
APAS	Automotive Parts and Accessory Systems R&D Center
APEX	Accelerated Program for Education Excellence
APHERP	Asia Pacific Higher Education Research Partnership
ARC	Australian Research Council
ASTRI	Applied Science and Technology Research Institute
ASTS	Academic Staff Training Scheme
AUQA	Australian Universities Quality Agency
BK21	Brain Korea 21
CAS	Chinese Academy of Sciences
CCSSE	Community College Survey of Student Engagement
CDR	Center of Drug Research
CICES	Center for Research in Creativity and Higher Education
CIDE	Comparative, international, and development education
CINTEC	Center for Innovation and Technology
CNIC	National Council for Innovation and Competitiveness
COE	Centers of excellence
COIN	CUHK Open Innovation Network
CONICYT	National Commission for Scientific and Technological Research
CORE	China Open Resources for Education
CORFO	Corporation for Development
CPC	Communist Party of China
CRC	Cooperative Research Centre
CRF	Collaborative Research Fund

CRI	Centers for Research Initiative
CSU	California State University
CUHK	Chinese University of Hong Kong
DCMS	Department for Culture, Media, and Sport
DEEWR	Department of Education, Employment, and Workplace Relations
DTVE	Department of Technological and Vocational Education
DVC A&I	Deputy vice chancellor of academic and internationalization
DVC ICN	Deputy vice chancellor of industry and community network
DVC R&I	Deputy vice chancellor of research and innovation
EGM	Emerging global model
EPSCoR	Experimental Program to Stimulate Competitive Research
ERA	Excellence in Research for Australia
FoR	Field of Research
GDP	Gross domestic product
GERD	Gross Expenditure on Research and Development
GRF	General Research Fund
GRI	Government research institutes
HBS	Harvard Business School
HE	Higher education
HEIs	Higher education institutions
HERDC	Higher Education Research Data Collection
HICOEs	Higher Institution Centers of Excellence
HKBAN	Hong Kong Business Angel Network
HKIEd	Hong Kong Institute of Education
HKRITA	Hong Kong Research Institute of Textiles and Apparel
HKSAR	Hong Kong Special Administrative Region
HKU	University of Hong Kong
HKUST	Hong Kong University of Science and Technology
HUST	Huazhong University of Sciences and Technology
IAC	Industry-academy cooperation
ICO	Innovation and Commercialization Office
ICT	Information and communications technologies
IEMs	Institutional Effectiveness Measures
INFORMM	Institute for Research in Molecular Medicine
IP	Intellectual property
IPPTN	National Higher Education Research Institute
IPS	Institute of Postgraduate Studies
ISO	International Organization for Standardization
IT	Information technology

ITC	Innovation and Technology Commission
ITF	Innovation and Technology Fund
KCC	Kapiolani Community College
KELA	Kapiolani Engagement, Learning, and Achievement
KMT	Kuomintang
KNIT	Knowledge Network Institute of Thailand
KPIs	Key Performance Indicators
LED-FPD	Light Emitting Diode and the Flat-Panel Display
LSCM	Hong Kong R&D Center for Logistics and Supply Chain Management Enabling
MIT	Massachusetts Institute of Technology
MOE	Ministry of Education
MOEA	Ministry of Economic Affairs
MOHE	Ministry of Higher Education
MOOC	Massive open online courses
MOOE _s	Massive Open Online Experiments (Courses)
MOOR _s	Massive Open Online Research(s)
MTR	Mass Transit Railway
NaHERI	National Higher Education Research Institute
NAMI	Nano and Advanced Materials Institute
NCGP	National Competitive Grants Program
NCHE	National Council on Higher Education
NCSE	National Center for Science and Civic Engagement
NGO	Nongovernmental organization
NHESP	National Higher Education Strategic Plan
NHMRC	National Health and Medical Research Council
NIE _s	Newly industrialized economies
NRCT	National Research Council of Thailand
NSC	National Science Council
NSF	National Science Foundation
NSSE	National Survey of Student Engagement
NUS	National University of Singapore
OECD	Organization for Economic Co-operation and Development
OFIE	Office for Institutional Effectiveness
OHEC	Office of Higher Education Commission
OLT	Office of Learning and Teaching
PASS	Postgraduate Academic Support Services
PPD	Personal and Professional Development
PPP	Public-private partnership
PRC	People's Republic of China
QS	Quacquarelli Symonds
R&D	Research and development

RCMO	Research, Creativity, and Management Office
RDI	Research, development, and innovation
REF	Research Endowment Fund
RGC	Research Grant Council
RMIT	Royal Melbourne Institute of Technology
ROC	Republic of China
RTDs	Research, technology, and development networks
RU	Research University
S&T	Science and technology
SCI	Science Citation Index
SENCER	Science Education for New Civic Engagements and Responsibilities
SET	Stock Exchange of Thailand
SL	Service learning
SLLT	SL Leadership Team
SLOs	Student Learning Outcomes
SMEs	Small- and medium-sized enterprises
SNU	Seoul National University
SSCI	Social Science Citation Index
STEM	Science, technology, engineering, and mathematics
TCOBS	Thailand Consortium of Business Schools Technologies
TEQSA	Tertiary Education Quality and Standards Agency
THU	Tsinghua University
UCLA	University of California, Los Angeles
UGC	University Grant Committee
UHM	University of Hawai'i, Manoa
UKM	Universiti Kebangsaan Malaysia
UM	Universiti Malaya
UMC	University Management Committee
UPM	Universiti Putera Malaysia
USM	Universiti Sains Malaysia
USR	University Social Responsibility
UT	University of Texas
UTM	Universiti Teknologi Malaysia
VTC	Vocational Training Council
WASC	Western Association of Schools and Colleges
WCU	World-class university
WPI	World Premier International Research Center Initiative
WTO	World Trade Organization

Chapter 1

Introduction

*John N. Hawkins, Ka Ho Mok,
and Deane Neubauer*

Research and development (R&D) have long been key components of what have generally been called “research universities.” There is also recognition that in order to stay on the cutting edge of R&D, higher education institutions (HEIs) must increasingly strive for innovative R&D; this has important implications for the structure and governance of higher education (HE) as well as numerous other factors of HE change and transformation. Furthermore, in a manner that may be unprecedented in the period of the so-called modern university, innovation has been thrust upon the university almost as a form of social responsibility. Interestingly and overwhelmingly, due to the role the university is performing within the emergent knowledge society, innovation in the “knowledge-transfer” functions of the university—the teaching role foremost among them—has assumed increasingly greater importance (Neubauer 2011). In this book we would like to focus our attention on several of these factors including, but not limited to, the following suggestions.

There is a fundamental issue of the location of R&D in the academy structure. It is widely acknowledged that in many settings, including most members of the Organization for Economic Co-operation and Development (OECD), R&D typically resides in recognized research HEIs. Yet, in many cases, as massification has occurred and as hierarchical relationships have resulted in differential funding and prestige levels, there has been what is sometimes referred to as “mission creep.” An example in the United States is the California Master Plan, which was

designed to define a clearly delineated structure that focused R&D on the University of California segment, teaching and some research on the California State University (CSU) segment, and teaching and open access on the Community College segment. For a variety of socioeconomic reasons (not the least of which is the opportunity of overhead funding from external research grants), faculty in the CSU segment have been “creeping” toward replicating the R&D functions of the University of California segment, thus blurring the boundaries between the research functions of the system. Similar forces are present in newer systems in Japan, China, Hong Kong, Taiwan, and Korea to name just five Asia Pacific settings. These forces have a significant impact on the organization, planning, and governance of HE with respect to R&D and the emphasis on innovation (Hawkins and Jacob 2011).

A related issue of “location” relates to the so-called triple helix of university, industry, and government relations. In recent years, a number of concepts have been proposed for modeling the transformation processes of this three-way interaction. Adding the notion of innovation requires the blurring of boundaries between them and suggests different modes for the production of new knowledge. Knowledge flows are recursive rather than linear, and suggest many new and novel ways to think about R&D and the knowledge revolution. While typically discussed with respect to the sciences, this model has equal relevance for all areas of knowledge production including the social sciences and humanities (e.g., the nature and impacts of health policy) even though these have been much less self-consciously studied as such. Some of the chapters in this volume attempt to revisit the triple helix model in conceptualizing state-enterprise-university relations. Chan and Mok’s chapter critically reviews how universities in Taiwan have engaged with the industry and enterprises for promoting innovation and knowledge-transfer activities. When exploring deeper university-enterprise cooperation, Chan and Mok have found that the existing triple helix model has actually missed one important dimension—the growing importance of the civil society or local community in promoting innovation, community-based business, and community development when deepening their cooperation with universities (see Chan and Mok in this volume). Meanwhile, scholars and researchers gathered at the University of Hawaii, Manoa, in July 2014 to discuss social policy responses and social innovation focusing on Asia, with one of the prominent themes being “bringing the society” back. When reflecting upon the changing role of the state in social-welfare provision and social policy design, especially in the state-alone mode, many Asian governments have found it difficult to sustain the growing expenditure on social welfare/social policy. It is in this context that social enterprises

and community-based enterprises are strongly encouraged to work with the university sector for translating local knowledge into commercialized products in the market place.

Another fundamental issue has to do with the historical distribution of R&D in HE, with Europe and North America having a head start and HEIs in other emerging economies developing capacity later and forging links in a variety of ways with leading universities in those settings. There are various implications for this, especially in the increasingly globalized environment, in areas such as cross-border research and the migration of intellectual talent (the so-called brain-train); massification of academic research, basic research, academic research, and new public management; rise of private funding; internationalization of academic research; new social contracts for research; the role of new developments in technology; emerging “new giants” such as India and China (as members of the BRICs); the role of regionalization in R&D and innovation (e.g., the Bologna process in Europe and various new Asian and Pacific regional organizations); the link between R&D and innovation and the burgeoning quality assurance and accreditation movements especially on the international level; the financing of R&D; and the increasingly blurred role between the public and private sectors and their impact on R&D and innovation. The entire landscape of HE, with its various institutional structures and functions has been enormously impacted by the role of emergent private sector HEIs, many of them acting cross-nationally, some of which are enrolling hundreds of thousands at a time, gaining significant returns on capital, and impacting in major ways the status of traditional HEIs within their accustomed national settings (Hawkins 2011).

These issues represent broad, regional, and global concerns. Focusing on the HEIs and their responses to these broader forces leads to more specific concerns such as the purpose and functions of R&D and innovation in the academy and how dramatically changed funding patterns have impacted the organization of R&D and innovation. In many recognized research institutions, there has been a decreasing reliance on state/government funding for R&D and an increase in the role of private funding from the corporate sector in order to mount the kind of research necessary to remain competitive. This has implications for the basic research and applied research shares of the R&D effort, as well as academic autonomy and innovation. There are additional implications for the social returns to HE from this changed research landscape such as the relationship between employment and R&D investment that underpins the “high skills” strategy of many governments and HEIs in the Asian Pacific region. It is here that the innovative aspects of private sector (often proprietary) HE are being most experienced. At the institutional level this impacts the relationship

between the postgraduate education experience and training and the labor market—the classic “alignment” issue.

The broad area of internationalization and the role of globalization in HE within the context of competition and rankings have contributed to an environment in which R&D and innovation are inextricably linked between institutions within the Asia Pacific region and between it and other global settings. These linkages are increasingly being recognized by HE leaders in the United States and Asia as well as Europe, even as others seek to critique and clarify such concepts as globalization and internationalization. It is now clear that breakthrough discoveries will also occur in many parts of the Asia Pacific region and many HEIs in the United States and elsewhere are seeking active partnerships and collaborative arrangements in order to participate in these new ventures. One aspect of this development may be a rethinking of how intellectual property regimes within countries are distributed between HEIs and other sources of knowledge innovation. Overall, how these linkages develop and enhance R&D and innovation in cross-regional settings is a critical question that we hope some of the chapters in this volume will address.

The quest for new approaches to R&D, entrepreneurship, and innovation has also had a significant impact on HE governance. In the Asian Pacific region and in the United States, HEIs have long incorporated offices and centers for R&D within their governing structures. More recently there have been more proactive efforts to establish new administrative units to focus on innovation as it relates to more traditional R&D. Chief Innovation Officers have been appointed in many HEIs in the region, usually attached to schools and colleges where R&D is typically performed (e.g., Science, Technology, Engineering, and Mathematics [STEM] areas, medical schools, engineering schools, etc.). This represents a new administrative input into the governance architecture of HE and one that has been little studied regarding its impact and effectiveness. As for the transnational mass-scale proprietary HEIs, the governance relationship has been fundamentally restructured as a result of “unbundling” traditional faculty relationships and roles while transforming the faculty role within the institution to that of a focused, specialized, contract employee. Decisions typically made within traditional HEI structures as part of the governance structure are increasingly made within a corporate management framework.

There is a realization that dependence on state sources of funding and support are not likely to meet the pressing demands from students and parents in Asia for high-quality education. Therefore, it is not surprising to see that Asian governments have adopted policies to encourage the private sector to get involved in developing an education market, and

public universities are being strongly encouraged to engage with industry and business for deep cooperation. In this way, states want to see more synergy between the university and enterprise for promoting innovation, knowledge-transfer, and entrepreneurial activities of different kinds (Mok 2013a; 2015; Chan and Mok in this volume). Mok's recent comparative study related to university-enterprise cooperation in selected East Asian economies such as Singapore, Taiwan, South Korea, and Hong Kong has clearly shown a growing regional trend in Asia to foster stronger and closer relationships between the university sector and industry and business. The development of these linkages has not only diversified economic activities providing a strong impetus to the development of new economic pillars in South Korea and Singapore along with an integrated pattern of innovation and creativity but has also affected the way university is managed and its performance measured (Mok 2012). Surveys and field interviews were conducted by Mok in examining how academics assess and evaluate the call for deeper university-enterprise cooperation in East Asia and how this has clearly revealed the diverse views and opinions expressed by faculty members from different academic disciplines. Predictably engineering and business sectors show more support for these efforts, while humanities and social sciences colleagues have criticized HE for being run as commercial companies in which education ideals are jeopardized (Mok 2013b; Mok and Nelson 2013). The call for closer relationship between university-industry-business has no doubt made academics more critical of the imposed forms of privatization, marketization, and commercialization of HE (Turner and Huuseyin 2014).

Thus we see the following topics, among others, addressed by contributors to the book, seeing them primarily as hypotheses to be sharpened and/or revised.

- Massification of HE has resulted in a problem as to where R&D and its innovative mission should reside in HE systems. Systems in the past have sought to lodge R&D in discrete kinds of institutions and restrict it from others (e.g., the California Master Plan) but this approach has eroded as non-research-oriented HEIs have sought to move up, resulting in a form of mission creep.
- Government policies that promote research and innovation are (a) on the increase, (b) extend to and invite new relationships especially among private sector actors (but not exclusively), (c) are occasioning new ways of linking HEIs to the research and innovation activities of society, with (d) increasingly novel ways of both financing and recovering the benefits of research and innovation (including intellectual property rights).

- University responses to university-industry-business cooperation are becoming more common among HEIs in all Asian countries (if highly differentiated) with strong implications for university governance structures and relations. Overall, research is being repositioned within university structures with a range of impacts that include re-stating of faculty and reconsideration of the kinds of skills and capabilities that both undergraduates and graduates should possess. As a general rule the HEIs are subject to a wide range of pressures to assure that graduates have skills deemed necessary by national, regional, and global economies.
- Regarding the mission of the university, Asian university perspectives are essential here. As HEIs continue to develop across the broad range of demographic, societal, and economic transitions characteristic of Asian societies, universities are being looked upon as focused sources of retention and articulation of those elements within such societies that “make them Asian.” This extends to the understanding of the university itself as an institution and its mission to embody and to continue developing Asian perspectives.
- University strategies in enhancing research capacity are becoming both more intense and more comprehensive as the range of university-related research grows. Such efforts extend from developing and sustaining research activities within HEIs, previously known almost exclusively for their teaching role, to developing curricula that align the university with major issues within the world at large (e.g., population growth and entailments, societal aging, technology transformations, climate change, global financial issues, globalization, etc.).
- Within this environment of intense concentration on R&D and innovation, impacts on university governance are large as new activities come to be pursued within universities that require novel approaches and tend to “privilege” other parts of the institution than those that gave rise historically to governance structures.

All of the above constitute what has been called a dominant paradigm in HE. However, with a new emphasis on innovation and change, there is movement in some new directions that hold much promise for the future (Hawkins 2007). The book contains two large clusters of chapters. One focused on “policy implications for shifting research capacity and development,” and the other on “entrepreneurship, innovation, and development in the research domain.” Taken together the chapters that make up these two parts do so in an eclectic manner utilizing multidisciplinary approaches, case study examples, policy analysis, and the historical context in which such changes are taking place. It is our hope that the diversity

in approaches to these large and challenging issues will stimulate further discussion of the future development of HE's major mission: R&D and innovation.

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Part I

Policy Implications for Shifting Research Capacity and Development

Chapter 2

Developing Research Capacity in Education Schools and Faculties in Newer Universities Seeking Research Excellence and Entrepreneurship*

Annette Gough

Introduction

All forms of formal education in Australia—from early childhood through the formal years of schooling to tertiary education—are increasingly under the microscope in Australia, and internationally, with all sectors under pressure to transform their practices by better engaging students, improving student outcomes, and teaching smarter, as well as addressing a range of social and political imperatives.

This pressure includes the following initiatives that build on decades of inquiries into education and teacher education by state and federal (Australian) governments and parliaments:

- The Australian government's Better Schools Plan that begins in 2014. This is a plan to improve results of all schools and all students by introducing education reforms that evidence shows improve results with the aim of taking Australian schools into the top five in the