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# An entrepreneurial, research-based university model focused on intellectual property management for economic development in emerging economies: The case of Bogor Agricultural University, Indonesia

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## ABSTRACT

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Higher education institutions in emerging regions of the world are increasingly expected (largely by their governments and community) to promote regional economic development and national competitiveness. This case study on one of the prominent academic universities in Indonesia – Bogor Agricultural University (Institut Pertanian Bogor, IPB) – highlights its successes and lessons learned in managing intellectual property as an entrepreneurial research-based university. This analysis of IPB provides general and specific insights for university administrators, researchers, and policy makers, especially in emerging economies, on appropriate strategies and measures in promoting synergies between research, entrepreneurialism and technology commercialization. The model provides strategies to maximize university research outputs, knowledge transfer and innovation to empower regional communities, and promote strategic and transformational partnerships, private sector engagement and economic growth opportunities for both the institution and the region.

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## 1. Introduction

This paper examines the programs of Bogor Agricultural University (Institut Pertanian Bogor, IPB) that support the university's goal of becoming an entrepreneurial, research-intensive university. IPB is the largest agricultural university and an important player in Indonesia's innovation systems for agriculture; it serves as a good case study of how Indonesia's higher education institutions (HEIs) are responding to regional and global challenges and opportunities. Although the management of knowledge and innovation of Asian universities has been featured in many noteworthy publications, Indonesia's case is of particular interest because of its current status as an emerging and booming economy. The added missions imposed on Indonesian universities to support sustainable growth and economic development are of relevance to HEIs in other emerging economies, which are increasingly expected to do the same. Indonesia's IPB has made great strides in restructuring itself

based on an entrepreneurial, research intensive model to address national and global challenges and opportunities.

This case study draws on primary and secondary data, analysis of published studies, reports, and statistics, selected articles, policy documents and patent databases over the four year time period of 2008–2012. Expert opinion was sought from public and private sector intellectual property (IP) practitioners to analyze the current state of IPB's IP and technology management efforts and provide appropriate recommendations for further growth in the research and technology commercialization sectors. Analysis on the four "P"s, people, policies, processes, and products of IP management was modeled on the study of Payumo et al. [1]. Critiques of the impact of IP and patents to the mission and role of public sector institutions such as HEIs, including the suitability of policy and legislation such as the U.S. 1980 Bayh–Dole Act on technology transfer, as relevant to Indonesia, are beyond the scope of this paper.

## 2. Higher education institutions as economic engines

Universities have frequently been regarded as key institutions in processes of social and intellectual change and development. The

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World Bank report *Higher Education in Developing Countries: Peril and Promise* [2] has further rationalized the existence of universities: “As knowledge becomes more important, so does higher education. The quality of knowledge generated within higher education institutions, and its availability to the wider economy, is becoming increasingly critical to national competitiveness”. With the current focus on producing “globally educated citizens”, the most explicit expectations of a university today regardless of social and economic conditions and geographic location are in providing quality education, the training of the future workforce, and the production of high income, skilled labor [3]. Academics and graduates produce cutting-edge science, new ideas, knowledge, and university-based innovations that can be the major drivers of economic and social development [4–7].

### 2.1. Research-based to entrepreneurial universities and role of intellectual property

Modern technological developments, globalization and increasing pressure from policy makers and funders have required public universities to emphasize economic development as a fourth pillar to education, research and service. Funding agencies and donors in the U.S. and in other countries are looking for and demanding evidence of tangible outcomes from funded research that can improve quality of life, create business opportunities and promote economic development. Universities are now required to transform themselves from ‘ivory towers’ of scholarly pursuit to entrepreneurial enterprises of innovation, knowledge transfer, and technology commercialization [8,9].

Advanced universities across North America, Europe, and recently Asia, are increasingly shifting their traditional primary roles in education and scholarly output to becoming “entrepreneurial, research-intensive” university models that emphasize interdisciplinary engagement, commercialization of institutional IP, knowledge partnerships, and active contribution to the development of private enterprises in the local and regional economy [10]. Notable US and European institutions in these efforts include: Massachusetts Institute of Technology, Stanford University, and UC Berkeley in the U.S.; and University of Cambridge, University of Oxford, and Imperial College, London in the U.K. [11]. In Asia, Singapore’s National University of Singapore (NUS), a strong partner of the government’s Agency for Science, Technology and Research (A\*Star) is known for its synergistic public/private activities that promote the spirit of innovation and generating value from university resources through industry engagement and entrepreneurship [12,13]. The U.S.-based Association of University Technology Managers (AUTM) recently reported that efforts of U.S. universities have resulted in increased research expenditures, intellectual property rights (IPR) filings, commercialization agreements, and startups based on university inventions (“initiated” as well as “still in active business”) [14].

The 1980 US Bayh–Dole Act (now in its 32nd year) and similar legislation are credited as the primary catalysts for increased academic and technological entrepreneurship in U.S. and other countries [15]. These laws have enabled universities to claim title to inventions supported by government funding and for their scientists to participate in the commercialization of university inventions. Besides national legislation, some of the factors that may have contributed to the high-profile successes of entrepreneurial, research-intensive universities around the world include: (1) a well-funded high quality research system that encourages researchers to do more innovative research and generate technologies and products that can be used by industry; and (2) provision of adequate incentives and support to encourage faculty participation

especially in disclosing, protecting, and commercializing a university invention [16].

Creating an entrepreneurial, research-based university model likewise requires good IP management and technology transfer programs. The presence of IPR protection, patents for instance, for university “off-the-shelf” technologies can help facilitate contractual transactions of intangible intellectual assets of universities between the university and technology buyers/users, particularly the private sector, and thereby accelerate technology transfer. The primary benefit of this process whether for commercial or for humanitarian uses is the exploitation of research results to benefit society; other significant benefits include generation of funds from licensing fees that can be funneled back into research, IP education, and technology transfer activities at the university, and as additional reward to the researcher. IPR have also become more important to universities in other respects. University researchers, especially those working in modern biotechnology, now must understand the IPR context in which they are conducting their research to make sure they are not infringing the IPR of other researchers and institutions [1,17–19]. Understanding the potential for university technologies has also become critical so that researchers can initiate necessary institutional strategies early in the process so as to not lose or compromise future IPR. IPR issues are also increasingly important in establishing research partnership with other institutions, locally and internationally, especially when proprietary research materials (such as germplasm) are involved [17]. Increasingly, inter-institutional agreements and sponsored research contracts have built-in IPR provisions for ownership, access, and commercialization of future IP; these measures require institutions and researchers to understand the nature of contracts and negotiable provisions, if and when needed. All these developments have required universities to implement institutional policies that address key issues, including ownership of IPR and benefit sharing in a commercialization process; strategies for and management of privately sponsored research, collaborative research, conflict of interest, and establishment of IP and technology transfer offices.

### 2.2. Response and implications for developing countries

Universities in developing countries such as in Asia are also facing the same pressure to be more entrepreneurial and to have an enhanced role in local economic and social development through modern approaches of expanding the commercialization of research. A number of Asian universities (e.g. Zhejiang University, China; Haryana Agricultural University, India; and University of the Philippines, Philippines), have taken the challenge and are now exploring different mechanisms to replicate the widely acclaimed successes of research-intensive, entrepreneurial universities in the US and other advanced countries [1]. These universities have setup and standardized their institutional IP policies and ownership in support of their national technology transfer laws that are mostly patterned after the US Bayh–Dole Act [15]. They have also established IP and technology transfer offices to handle patent filings, and have invested in entrepreneurial infrastructure, and services such as business incubation spaces and research parks to support university research and entrepreneurship. Investigating initiatives of other universities to add to this list such as in Indonesia, and how these universities address the opportunities and challenges in becoming an entrepreneurial, research-based university is, worthwhile.

This paper focuses on Indonesia’s public research university Bogor Agricultural University (Institut Pertanian Bogor, IPB), and its efforts, challenges, opportunities, and learnings in becoming an entrepreneurial, research-based university to contribute to the

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