University Reform Seen as Key to Improving Research

YOGYAKARTA, INDONESIA—Jazi Istiyanto hit the ground running when he returned to the University of Gadjah Mada (UGM) here in 1996 after receiving his Ph.D. from Essex University in England. Within weeks, the 36-year-old physicist and electrical engineer had teamed with colleagues to set up the new Reconfigurable Electronics Research Group and applied for a competitive government grant (which he won) to extend his work on microprocessors and advanced memory architectures. The research involves manipulating the wiring and structure of a microchip to fit a variety of uses. Istiyanto also has big plans to commercialize his work, including a

joint effort with Telkom, the country's giant communications utility, and perhaps forming a start-up company.

But Gadjah Mada, one of the nation's premier research universities, isn't the only place the hard-driving and enthusiastic young scientist hangs his hat. Istiyanto, like thousands of other Indonesian academics, also lectures at nearby private colleges to supplement his meager salary. What he can earn there for teaching one 10-week course (which consists of a weekly 2-hour lecture and a final exam) nearly matches his annual salary. Indeed, driven by the need to support his wife and three small children, Istiyanto

spent his first year back in Indonesia teaching courses at eight area colleges in addition to UGM. Although he has since cut back sharply on his moonlighting, the killer workload isn't the only thing he's happy to escape. "The students are less motivated at a private university," he says. "They don't want to learn; they just want the degree so they can get a better job."

Throughout Southeast Asia, academic researchers such as Istiyanto are key pieces in a puzzle that their governments are trying to assemble as they strive to improve their systems of higher education. The pieces include higher quality students, better faculty pay, a stronger commitment to research, and increased revenue from outside sources. The goal is to produce a technologically trained work force that will help these nations achieve sustained economic prosperity. That's a tall order for institutions that, in some cases, are quite a bit younger than the students attending them (see below and sidebar on p. 1476).

Malaysia Orders Up MIT Clone

KUALA LUMPUR, MALAYSIA—Every developing country dreams of having a university whose faculty and students can compete with the Massachusetts Institute of Technology (MIT). But Malaysia has gone one step further. Rather than simply trying to emulate MIT's success in world-class research and entrepreneurship, it has hired that university's engineering department to create a graduate university for the next century.

The Malaysian University of Science and Technology (MUST) is a new venture for both sides, made possible by a 1996 law allowing the existence of such private universities. "MIT already has ties to universities all over the world. But this is the first time that it has helped to set up a university from scratch," says Rudin Salinger, a U.S.-bred physicist and educator with long experience in Malaysia, who has been hired by MIT as its local representative.

Hired hand. MIT's Fred Moavenzadeh looks to overseas talent pool.

The idea for MUST came from a wealthy businessman and political insider, Datuk Effendi Norwawi. It won the backing of Prime Minister Mahathir Mohamad, who saw it as another way to bolster the country's technological prowess. Effendi's Ehsan Foundation is putting up $25 million to get the ball rolling, and the Ministry of Science, Technology, and the Environment has asked for RM100 million (US$25 million) over 5 years to help support its activities.

This fall, MUST hopes to admit its first class of 100 or so students to pursue master's degrees in one of four engineering specialties—information technology and multimedia, transportation, biotechnology and chemical processing, and systems design and management—with plans to add fields, as well as doctoral degree programs, as staffing allows. The courses will follow MIT's

research-based curriculum and explore real-life problems, first by teams and then individually. U.S. faculty members will tape lectures and send them to their Malaysian counterparts, and course material will also be available on the World Wide Web.

Organizers hope to hire faculty from a pool of Malaysian scientists now working and studying abroad, particularly in Singapore, at salaries competitive with those offered by Western institutions. They also have pledged not to raid public universities for talent. "That would be taking from Peter and giving to Paul," says MIT engineering professor Fred Moavenzadeh, co-director of the project. Even so, Moavenzadeh admits that talks are under way with two senior Malaysian academics—electrical engineer Zawawi Ishmail, now vice chancellor of the University of Malaysia at Sarawak, and astrophysicist Mazlan Othman, head of the government's space science programs—to be MUST's president and provost, respectively. But government approval is needed for the appointments of these career civil servants.

Underwriter. Datuk Effendi Norwawi got the ball rolling for MUST.

Recruiting students isn't expected to be a problem, however. Tuition was set at a relatively low US$7500 a semester and was pegged to the value of the ringgit before devaluation, making it even more of a bargain at today's exchange rates.

MUST will begin its life in rented facilities at SIRIM, the government's standards research institute. But work is already under way on a 40-hectare site near a high-technology park that's home to a factory for Proton, the national car. Indeed, government officials hope that MUST will open the floodgates to a flow of advanced products. "We hope that MUST will bring the tradition of MIT to Malaysia—teaching through problem solving," says Tan Sri Omar Abdul Rahman, the prime minister's science adviser. "I think MUST will grow over time, and I'd like to see a few more universities like that."   –J.D.M.

Role models. Individual scientists have an important role to play in assembling that puzzle. "Young people lack the models of research leadership, the grouping of talent around a well-known researcher. That isn't happening yet," says Tan Sri Omar Abdul Rahman, a former university vice chancellor and, for the past 14 years, science adviser to Malaysian Prime Minister Mahathir Mohamad. Biologist Phaik Hooi Tio had seen that lack of leadership firsthand in Thailand and

Quality counts. Emil Javier says standards must stay high during expansion.

Malaysia before she came to work with virologist Jane Cardosa at the fledgling University of Malaysia at Sarawak. "The head of the lab is important, because in Asian cultures we watch what our boss does. If your boss says it's OK to take it easy, then people don't work very hard."

A similar passivity affects many university administrators, says Triono Soendoro of BAPPENAS, Indonesia's development planning agency. Rather than blaming their problems on others, he says, academic officials should set high goals and then figure out how to reach them. "At ITB [the Institute of Technology at Bandung in Indonesia], about 35% of the faculty hold Ph.D.s—and that represents the best of the best," he says. "Why isn't the percentage higher? They have to make the change themselves, to make a commitment to improving the quality of teaching and research."

That's what marine biologist Edgardo Gomez did more than 20 years ago when he was asked to create a marine science institute at the University of the Philippines, Diliman. Now, it is the only institute in the Philippines with an all-Ph.D. faculty, and it may be the country's most productive in terms of papers. His success, says Gomez, is attributable to a good staff. "I was able to get a bunch of people as crazy as I am," he laughs, "who work hard and don't ask for too much."

Malaysian corporate reforms. Individuals like Gomez can only achieve so much on their own: Their efforts to create top-class labs are constrained by the systems within which they work. For most academic researchers, that means a myriad of government-imposed restrictions on how they interact with colleagues and the outside world. Malaysia is, however, leading the way in freeing its leading institutions, including its universities, from tight government controls. Although its primary goal is to trim government expenditures by shedding tens of thousands of civil servants, the

new corporatization policy also frees institutions to create for-profit companies, revamp administrative practices, and otherwise set their own course.

The University of Malaya (UM) took the plunge on 1 January, with several others close behind. "The idea is to become less dependent on the government, and to run the campus more efficiently," says Syed Jaladudin, vice chancellor of the University Putra Malaysia, whose 35,000 students make it the largest university in the country. "It's not about becoming more like industry; it's aimed at reforming the university structure so we can work better with the private sector." To ease the transition, which removes faculty members from the national pension system, the government granted them a 17% pay boost.

For some researchers, the changes are entirely pecuniary. "It really means a way [for the university] to make money," says Ali Hashim, a UM chemical engineer who recently stepped down as director of an interdisciplinary graduate institute on campus. "They aren't talking about improving research." But others see the new rules as a chance to increase the impact of their work.

Physicist V. G. Kumar Das, dean of UM's science faculty, has hatched a plan to share

opposition. Pornchai Matangkasombut, dean of the faculty of science at Mahidol University in Bangkok, says that if serious moves were made to reform personnel practices, "hell would break loose for sure."

This leaves Mahidol with few options for clearing out deadwood. Although the university produces more publications than the rest of Thailand's universities combined, says Matangkasombut, "productivity is very poor," an average of one paper per faculty member every 3.3 years. Older faculty members "have forgotten what research is," adds Mahidol biologist Visut Baimai.

Medical geneticist M. K. Tadjudin, who just completed a 4-year term as rector of the University of Indonesia (UI), openly admires his neighbor's moves. "We need more autonomy and more flexibility," he says. "But the politicians are afraid that we would use the opportunity to become a private entity and raise fees and not be responsive to the public." However, even in Malaysia the process falls well short of privatization, which would require universities to become self-supporting. The official goal is for schools to derive 30% of their operating funds from private sources within 5 years, although one top administrator says that achieving even a 20% share by 2002 will be difficult.

Banking on change in Indonesia. Lacking authority to create his own revenue sources for specific projects, Tadjudin has still managed to build up expertise in strategic areas. Grants from competitive programs funded by the World Bank, for example, have

Academic interest. Indonesia's M.K. Tadjudin, left, admires flexibility given Malaysia's Syed Jalaludin, center, while Thailand's Pornchai Matangkasombut worries about pace of reforms.

with industry a recently purchased critical mass of high-tech instrumentation—at a price. "The idea is to make it a one-stop center for industry. All the contracts and consultancies will be coordinated through one place," says Das, whose term was extended 2 years ago so he could get his project up and running.

Thailand has gone a step in this direction. National universities now have the option to adopt new charters that give them quasi-independent status, including greater flexibility on financial and personnel issues. But the universities have been cautious about exercising these new rights because of staff

helped turn around UI's computer sciences department. In doing so, its Western-trained faculty has emphasized a research-based curriculum that will ultimately also help the country's homegrown computer industry. "We were ranked No. 1 in the first round of URGE grants," says Bagyo Moehodihardjo, dean of the computer science faculty, referring to a competition for large center grants that is part of the World Bank project. "The award boosted our confidence, because it's not common for a computer sciences department to focus on research."

Bagyo, who confesses that at one point "our program was so bad that we thought

Carving Out a Culture of Excellence

SARAWAK, MALAYSIA—Zawawi Ismail admits that he was "bewildered" when his country's prime minister, Mahathir Mohamad, told him in 1993 that he had 5 months to draw up and implement plans for a new university here. The timetable alone was a killer. Even more daunting was the new school's location—a swath of secondary peat forest in western Borneo, an island

Out of the woods. Zawawi Ismail has won acclaim for his role in establishing Unimas.

separated from peninsular Malaysia by the South China Sea and by an even wider political, cultural, and economic gulf. "I had many sleepless nights thinking about how to create a culture of excellence in the midst of rapid change," says Zawawi, an electrical engineer. "I had ideas, but I had to find a way to accommodate them to the political realities."

But Zawawi found the challenge irresistible, so he left the National University of Malaysia (UKM) to become vice chancellor of the University of Malaysia at Sarawak (Unimas). Five years later, a visit to the campus—sprinkled with simple, wood-framed buildings that provide temporary quarters for its 2600 students and 298 faculty members until a permanent campus can be erected down the road—provides ample evidence of how he has begun to create that culture of excellence. His performance has so impressed Massachusetts Institute of Technology officials that they are eager to have him head the new Malaysia University of Science and Technology (see sidebar on p. 1474).

One Unimas innovation is teaching faculties that can cross disciplinary boundaries and reduce the traditional infighting between departments. The newest of eight, covering cognitive science and human development, is a novel response to a national mandate for universities to improve primary and secondary education. "We didn't want to confine ourselves to K–12 and university teaching," explains microbiologist Ghazally Ismail, deputy vice chancellor for research. "Our graduates are still qualified to become teachers if they get a diploma, but they know a lot more about how kids learn than the average teacher does."

Zawawi also recruited hard-charging scientists to head three graduate research institutes that focus on areas of regional and national importance—biodiversity and conservation, health and community medicine (see sidebar on p. 1467), and software technology. State officials have lent a hand by endowing two research chairs, one on the economically valuable sago palm crop and the other on medicinal chemistry to exploit a potentially active anti-AIDS agent found in rubber trees.

In addition to building up research capacity, Zawawi sunk a major chunk of his infrastructure budget into fiber-optic cables to lower the barriers to communication across campus—and, by extension, between Sarawak and the rest of the world. "From Day 1 the idea was to get connected, as quickly and thoroughly as possible," says Zaidah Razak, dean of the information technology faculty. Zaidah and her husband, Zahran Halim, director of software technology, left academic posts in New Zealand for the chance "to break new ground and test new models."

Zawawi also tries hard to send the right message to potential faculty members. "We are willing to share some of their dreams," he says about his sales pitch. "We can offer them a high quality of life and the natural beauty of the region. The isolation, in fact, has provided us with a sense of camaraderie." Faculty members who have signed on seem to agree, noting the freedom to pursue their ideas and the relative absence of bureaucratic barriers.

That harmony may also be a result of self-selection. "You have to be a pioneer-type personality," says Ghazally, a former UKM professor and administrator who also helped to build up the school's branch campus in the neighboring state of Sabah before coming to Unimas. "You need to have a strong vision and the energy to create something that can make a difference. That's what we're all trying to do here." —J.D.M.

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about closing it if we couldn't improve it," says the key to the department's turnaround was to become more selective. "We made a conscious decision not to accept poorly trained students. We decided that anyone we admit should be capable of becoming a research assistant after one semester. And we changed our undergraduate curriculum to be more research-oriented."

The department's focus on attracting the right students is a critical aspect of building up a faculty because, as in most Southeast Asian universities, those same students often constitute most of the hiring pool. "You recruit them when they graduate as undergraduates. Otherwise, you'll never get them

to come because the pay is so low," says Tadjudin. It is also rare for faculty members to change institutions once they decide to become academics. "The main challenges all come down to a matter of quality," says Emil Javier, president of the University of the Philippines system. "The idea is to expand and then put the pressure not to let standards slip."

Like his peers throughout the region, Tadjudin also laments a declining interest in technical fields among top students, who instead opt for business careers. While one silver lining in today's dark economic clouds may be increased interest in academic careers, that interest may be stifled by govern-

ment efforts throughout the region to reduce their payrolls. Despite Indonesia's plans to have more students attend college, for example, the number of faculty positions at each university is frozen, and most construction projects have ground to a halt.

The region's current economic crisis will likely exacerbate many of the problems facing universities, at least in the short run. But it may also spur needed reform. "They need to show some initiative," says Indonesia's Triono about academic officials in his country—and, by inference, the entire region. "They are afraid of making mistakes. But that's how you learn."

–Jeffrey Mervis and Dennis Normile