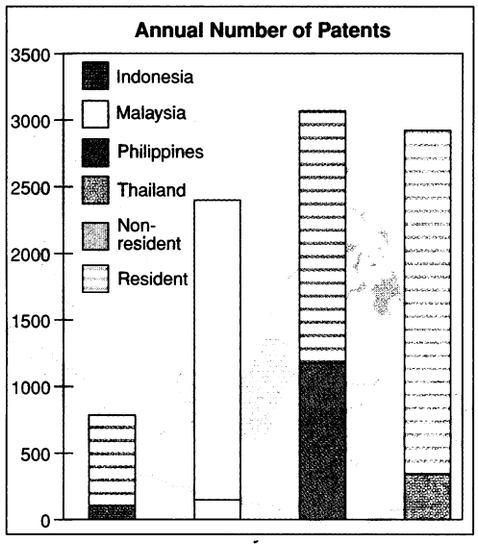
plied programs. "The policy is for greater emphasis on applied research," says V. Danabalan, secretary-general of Malaysia's Ministry of Science, Technology, and the Environment, in a comment that echoes the views of his peers in other countries. "In areas where we need to be strong to advance our priorities, we will support basic research, too. But research for its own sake is not something that we can afford."

However, putting an emphasis on applied research can leave academics feeling pulled in different directions. Promotion at most universities remains heavily weighted toward publications, and many researchers would like to see equal weight given to the extension work with farmers or joint work with industry. "Solving a practical problem is better than producing one publication that nobody reads," says Teresita Espino, a molecular biologist at the National Institute of Molecular Biology and Biotechnology, a part of the University of the Philippines, Los Baños.

And some professors think that the pendulum has swung too far toward immediate economic payoffs. "If they want to build up an electronics industry, they should be funding work in semiconductor physics," says W. C. Fon, a nuclear physicist at the University of Malaya and co-winner last fall of his country's Scientist of the Year award. "The pool of knowledge is drying up, and the 21st century will belong to those who are doing fundamental research. Unless you are able to improve the technology," he warns, "you won't succeed in the long run."



Patents pending. Most patent applications come from foreign entities.

Industrial-strength programs. To many government officials and scientists, the most critical issue is not what kinds of government research would best benefit the economy, but how to strengthen industry's capacity to develop and use new technology. Throughout the region, private sector spending on R&D is a tiny fraction of government spending. In Indonesia, for example, the figure is estimated at 20%. "The real issue is whether industry can accommodate and make proper use of the skills of the people coming out of the universities," says Katili. And Roger Posadas, former chancellor of the University of the Philippines, Diliman, and founder of that school's Technology Management Center, believes that until industry recognizes the importance of research, efforts to boost applied academic research efforts will be futile. "Even if [public research] budgets increase substantially, there will be no impact on the economy, because there is no demand for science and technology from the private sector," he says.

Although each country has a selection of carrots to try to get the private sector involved in research, they have generally had mixed success. Many private companies feel they have not yet reached a scale where they can afford much R&D. Indeed, governments are finding that there are few takers for some of the joint-venture grants. The Thailand Research Fund, for example, originally intended 50% of its funding to go to academic-industrial research, but because of the dearth of takers, the percentage has never risen above 10%.

Most observers agree that it will take a change of attitude on the part of both scientists and industrialists before the region's economies begin to reap the benefits of new technology. "In the U.S., you have the entrepreneurs to make it happen, to take the basic research and put it into a product," says Malaysia's Omar. "But this is not the mindset in the developing world."

–Jeffrey Mervis and Dennis Normile

PROFILE

Securing a Niche for Basic Biology

BANGKOK, THAILAND—When the Thai government started talking a few years ago about turning its wealth of flora and fauna into a biotech cornucopia, biologist Visut Baimai pointed out a fundamental flaw in the approach: The country had only a rudimentary idea of what existed. So Baimai, a professor at Mahidol University, launched a yearlong effort to gather support for a special research fund. "We need to do basic biology before we can apply it to biotechnology or genetic engineering" became his mantra.

It worked. In 1996 Thailand set up the Biodiversity Research and Training Program and made Baimai its director, giving him $12 million over 5 years for competitively reviewed projects. The amount may not seem large, but Baimai, age 56, is ecstatic. "This sort of research had never before been supported by the Thai government," he says.

The 120 research projects funded so far are heavily focused on field surveys and taxonomy. "You can always come up with new species here," Baimai says. Several projects also focus on long-term ecological change, while some—in a nod to applicability—are screening organisms with potential commercial value. The program also supports 80 master's-level students and field workshops.

The funding is especially sweet for Baimai, who earned his Ph.D. in genetics from the University of Queensland in Australia and did postdoctoral work at the University of Hawaii after joining the Mahidol faculty in 1969. "Basic science hardly got any support," he says, and so he sometimes dipped into his own pocket to fund his research on fruit fly and mosquito population genetics. Despite that handicap, "he's got a lot of publications under his belt," says Vudhipong Techadamrongsin, the deputy director of the Thailand Research Fund, who calls Baimai one of the country's foremost biologists.


D. NORMILE

Biology booster. Visut Baimai says research precedes economic payoff.

Baimai jokes that his prominence is due to the meager competition: "For fungi, for example, we don't have any experts at all in Thailand." To remedy that, Baimai hopes to create a more permanent fund for biology. "We'd like to see this activity go on for 5, 10, 20 years," he says, "and we're starting to talk about how to do it."

–D.N.