

# Funding Policy and Strategies for Basic Research by Academic Division of The Thailand Research Fund

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**ABSTRACT:** The Academic Division of The Thailand Research Fund (TRF), is responsible for providing funds to support basic research in science and technology, and social science and humanities. Three categories of research are currently being supported: (1) Investigator-initiated research is the research proposed by an investigator, which may be on any topics, but must be novel in idea and approach. Emphasis is on the creation of knowledge, which results in publications in reputable national and international journals, or peer-reviewed books. The support also aims to create career paths for professional researchers and is hence divided into three levels of grants: for young researchers, mid-career researchers, and senior researchers. The recipient of the last level is also named the TRF Senior Research Scholar, which is considered to be highly prestigious. (2) Strategic basic research, which is initiated and defined by TRF, covers areas that are deemed necessary for national development needs and for solving immediate problems. The research is target-based, and includes thematic programs on Pharmaceuticals, Nutraceuticals and Functional Foods, Sustainable Agriculture, Production of Aquatic Animals, Production of Land Animals, Stem Cell Biology and Regenerative Medicine, Nanoscience and Nanotechnology. The outputs are both publications, and patents or utilization for public benefits. (3) Translational research is the research initiated and defined by industry as the end user, in partnership with the researcher. It aims to utilize knowledge and research findings that are generated from the first two categories of basic research for industrial and commercial purposes. Output could be in the forms of patent, development of products or processes, especially those that will help in empowering and creating competitiveness for the small and medium enterprises.

**KEYWORDS:** Thailand Research Fund (TRF), Basic research, Strategic research, Translational research, Funding.

The national plans of almost every nation emphasize that research, particularly in science and technology, is a major driving forces for economic growth leading to social well-being, harmony and security. Therefore, funding policy, strategies, and management of research funding are the three most important instruments that will allow the nation to reach its development goals and attain national competitiveness. It is always a dilemma for the government and planners to decide what kind of research the nation should support, how much money should be invested, and how the funding should be managed to enable the nation to achieve its research goals. These decisions may be made in a “top down” manner, which most government funding agencies and planners are familiar with and find easier to implement. This usually begins with the establishment of targets and prioritization based on the idea that any research supported by the tax payers’ money should result in “immediate” or “short term” returns to benefit the economy. As a result, support for the necessary basic research, which does not seem to bear immediate applications, are often neglected or even condemned as wasteful. If such an idea is adopted as the cornerstone

of policy planning, and funding is made without awareness of the importance of basic research, the outcome may be damaging, rather than constructive and sustainable in the long run. This is because, holistically, research is like “growing a fruit tree”, since one cannot hope to collect and enjoy the fruits without looking after the health and well-being of the tree. Fertilizer and water must be given to the root system which is the foundation, to enable the stem and branches to blossom and generate the desirable fruits. By the same token for every translational research or development, there is always a basic research that serves as its foundation, so that the translational research or development does not become superficial, or lack dimensions, flexibility and adaptability to changes that are always perennial. Good translational and applied researches are best performed by researchers who are well grounded in basic principles of the sciences. Such research also needs teams of well-trained scientists using multidisciplinary approaches.

The importance of basic research is well-exemplified by some quotations of various Nobel Laureates, who have visited Thailand, as follows:

o “*The curiosity-driven research for fundamental knowledge is at least as important to human health and welfare as the search for solutions to specific practical problems. Government support of undirected basic research must continue if there are to be further technological advances and economic spin offs*”- Sheldon L. Glashow, Nobel Laureate in Physics, 1979.

o “*Since research is so expensive, can a developing country like Thailand afford to do basic research? Thailand cannot afford NOT to do basic research, otherwise it will never be able to compete*” William N. Lipscomb, Nobel Laureate in Chemistry, 1976.

o “*There is no such thing as basic and applied sciences, only good science and bad science*” Aaron Ciechanover, Nobel Laureate in Chemistry, 2004.

o “*Without basic research today, there will be no applications of science and technology tomorrow*” Tsung-Dao Lee, Nobel Laureate in Physics, 1957.

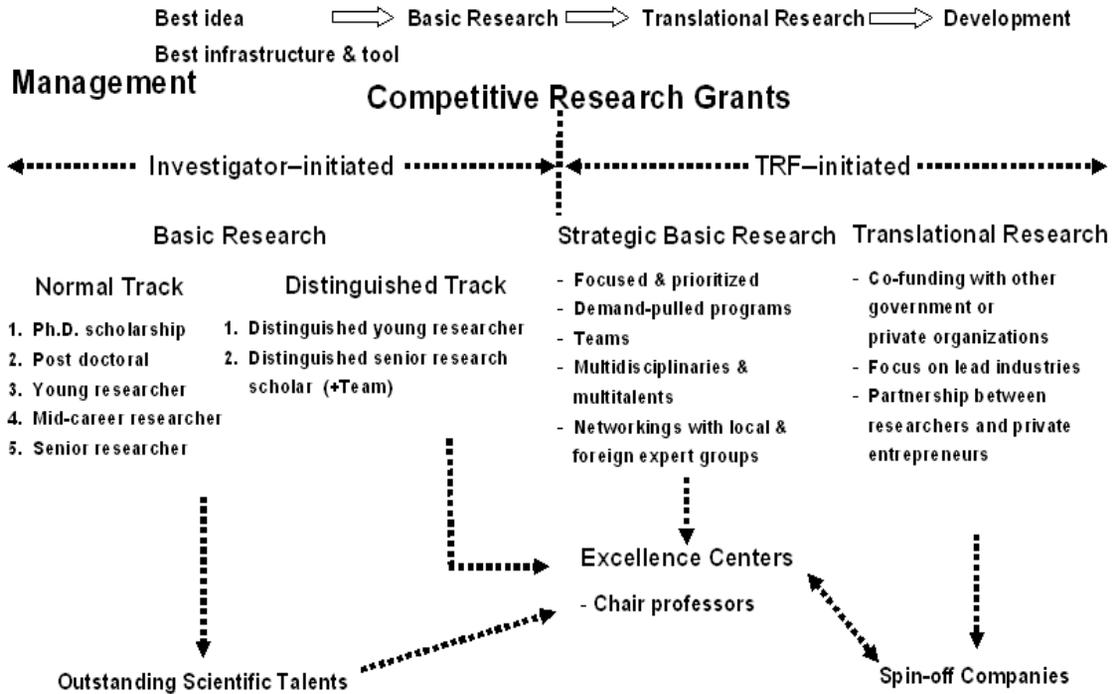
Unfortunately, Thailand still woefully lacks critical masses of well-trained scientists in many areas. Government and planners must be keenly aware that there is a need for continuous development of the human resources for research, a need to attract youth with brilliant minds and right attitudes to enter the scientific career. Ph.D. scholarships and postdoctoral fellowships are the mandatory first step for the nation to build its human capital in science and technology for development. Career-development research grants for new researchers will help to ease young researchers into their career, allowing them time to hone their skill and create professionalism. As incentives for extraordinary individuals with outstanding scientific talents, research grants for “distinguished young research scholars” should be created. At the mid-career and more senior levels, the research grants should be awarded to encourage and foster the researchers to work as teams, preferably with members from across-disciplines. If possible, the positions of “chaired professors” should be created for distinguished group leaders with excellent track records, who are based at universities. This strategy will help to create teams of truly competent and professional researchers and “centers of excellence” in various fields. Research support for all the activities mentioned above should be provided using the “bottom up” or “investigator-initiated” approach, which emphasizes support for the “best ideas” by the “best people”, that have been judged competitively and transparently by the peer review process, based on their scientific merits, originality, innovation, significance, as well as impact on knowledge creation and relevance to national development. Furthermore, consideration should be made of the feasibility of research methodologies to be employed, and most importantly of the track records of the researchers. These hallmark criteria must be used to

judge the quality of research proposals, so that the best research ideas could be performed by the ablest men. The outcome of the research could be publications in international journals that have high impact factor, patents that can lead to the development of useful products or processes, or direct and proven utilization of the knowledge gained for national development. We should not insist only on outcomes that may be translated to immediate economic benefits, since this will defeat the creation of the whole “value chain” of the research process itself.

It has been shown in many developed countries like United States, Canada, Western Europe and Japan that research funding for the “investigator-initiated idea” is a sound strategy in the long run for research that leads to both knowledge creation and utilizable discoveries. To facilitate, de-bureaucratize, and avoid nepotism in the funding process, and to allow continuous monitoring of research progress, a non-governmental and non-political funding agency should be created to manage the research fund. Good examples are the creation of National Science Foundation (NSF) by the United States government and the National Science and Engineering Research Council (NSERC) by the Canadian government. These are non-governmental bodies, commissioned by their respective governments, to manage the funding of science-engineering research and mathematics. This has created systems that are transparent, efficient and relevant to scientific and educational needs and national development. Many countries have since followed the US and Canadian models in creating such agencies as the instruments of funding to advance research to serve their national agenda. A case in point is Japan, which from 2003 has mandated Japanese Society for Promotion of Science (JSPS) to manage research funding for science, social science and humanities. JSPS is an independent funding agency operating under the supervision of Ministry of Education, Culture, Sport, Science and Technology (MEXT). Its peer-review process is broad-based and completely free from bureaucratic and political interferences<sup>1</sup>. In France, the National Research Agency (NRA) was created in 2005 using the same model and *modus operandi*<sup>2</sup>. This has created quite a stir in French scientific establishments that are not accustomed to investigator-initiated ideas and open competition. China has created the National Natural Science Foundation of China (NSFC) which has recently been separated, as an independent entity, from the Chinese Academy of Sciences. NSFC is mandated by the Chinese government to support basic research, to identify and foster scientific talents and to promote science and technology for national development. India, and even Egypt, are restructuring their research funding along the same lines of thinking<sup>3,4</sup>. It should be noted that in the views

**Mission** : Research to meet national needs for social, economic, security developments

**Strategy** : Best people



**Fig 1.** Research funding by the Academic Division of the Thailand Research Fund.

and experiences of these countries, the research-funding function of the granting agencies should be separated from the actual research activities. In other words, such funding agencies do not have in-house research units, nor do they carry out intramural research activities, lest this may create situations that could generate conflicts of interest, non-transparency, and compromise of the peer-reviewing system.

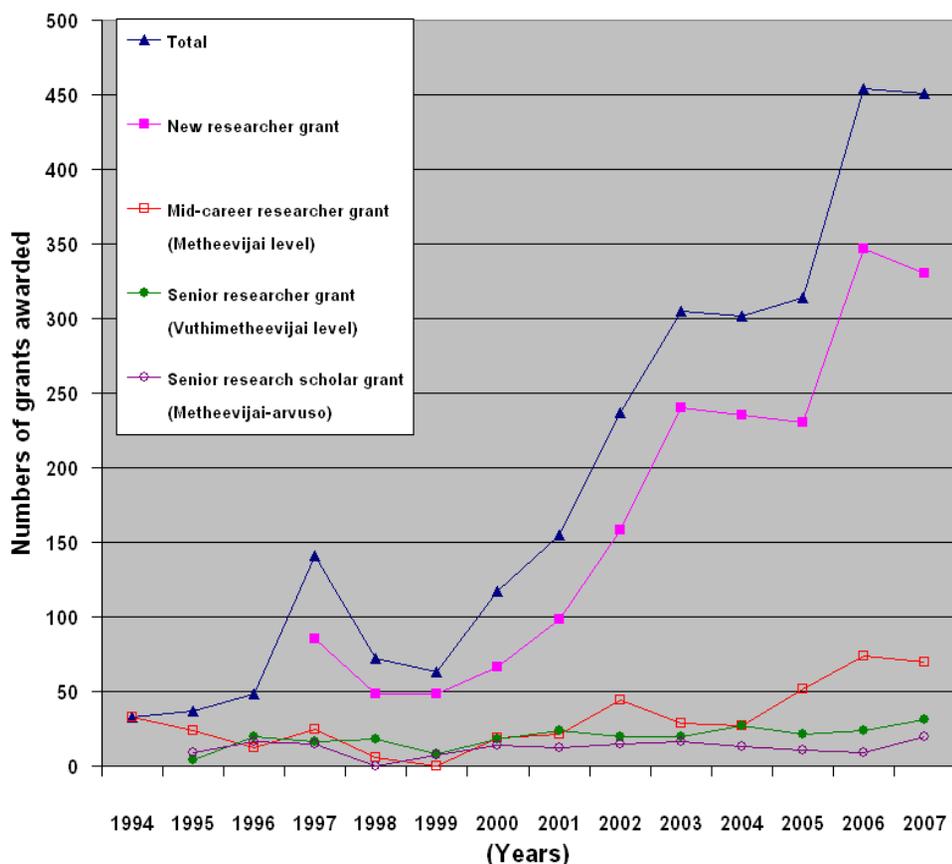
Based on the above philosophy (see also Figure 1), from 1994, the Thailand Research Fund (TRF) has created the Royal Golden Jubilee Ph.D. Scholarship Program that has so far awarded 2,100 scholarships, and up to now, graduated 900 new Ph.D.s. The TRF Academic Division, in co-funding with Commission on Higher Education (CHE), has so far awarded 1,900 career development grants to new researchers, and 440 grants to mid-career researchers (Metheevijai level), most of whom are university staff. At the next level, 251 grants have been given to mid-career researchers with outstanding outputs (Vuthimetheevijai level). At the highest level, 157 TRF Senior Research Scholar fellowships (Metheevijai-arvuso level, see also Figure 2) have been awarded to distinguished senior Thai scientists and researchers, who have strong track records and proven leadership to lead teams of younger and less experienced researchers to carry out research

in the areas, that are deemed relevant to national development, as well as contributing to the human resource training in their respective fields. The awards of these grants from the inception of TRF Academic Division are summarized in Figure 3.

In addition to investigator-initiated research we also believe that “Strategic or targeted basic research”, operated from “top to bottom” and based on a demand-driven mechanism, does have a role to play in research funding. This is especially the case, in the situation where funds are limited and research activities need to be focused to serve specific, immediate, as well as medium-term national needs. Actually, for this type of research, most government ministries have so-called academic departments and/or specialized research organizations that have already been mandated and funded, to perform specific research missions and tasks; and there are usually “in house” research units in these departments/organizations that carry out intramural research activities answerable to the missions of the ministries. Unfortunately, instead of confining themselves to specific missions that they are given, some of these research organizations tend to exceed their responsibilities and importance, and spread their “footprints” to cover domains of research other than their own. This results in a lot of wasteful overlap,



**Fig 2.** The Award Ceremony for the Thailand Research Fund Senior Research Scholars and Distinguished Researchers (2004) presided over by H.R.H. Princess Mahachakri Sirindhorn.



**Fig 3.** Numbers of various types of grants funded by the Academic Division, The Thailand Research Fund, between 1994 and 2007.

decreased cooperation, and unnecessary rivalries. It should be realized that no one organization can cover all the research activities for national development, thus all these specialized organizations and research departments of various ministries should stick to their mandated research missions. And if their intramural research units cannot carry out certain aspects of the research missions, they should “outsource” this research to other extramural researchers associated with institutes, universities, or even laboratories in the private sector, without feeling that they lose face.

The TRF Academic Division has realized that it has a role to play in supporting the “Strategic Basic Research” in areas that should serve the immediate needs of the country, especially in utilizing research findings by researchers based in universities, who are the majority recipients of TRF grants, for national development. The common criteria for support under these research programs are that the research must be highly focused, prioritized, and demand-driven by needs from various sectors of the country. Researchers must work in teams with multidisciplinary approach, and if possible, with participation from multi-institutional partners. Networking, with local as well as

foreign expert groups, is also strongly encouraged. At present there are four strategic basic research programs in operation. The first program is on “Pharmaceuticals, Nutraceuticals and Functional Foods” which has been operational since 2004. The other three programs now in operation are: Sustainable Agriculture, Production of Economic Aquatic Animals, Stem Cell Biology and Regenerative Medicine. In addition, two other new programs have recently been announced, namely Nanoscience and Nanotechnologies, and Production of Economic Land Animals.

Investigators, with basic research that demonstrates potential for immediate applications, are encouraged to apply for “translational research grants”. TRF has received co-funding from other government organizations, such as *the Office for Small and Medium Enterprise Promotion (OSMEP)* and many private companies, to provide support for research that focuses on applications in lead industries. The research should utilize knowledge or technologies derived from basic research to be applied in creating products or processes, which may be commercialized or used to help solve industrial production problems. The focus is especially on empowering and enhancing the research and

development capabilities of medium and small enterprises (SME), which are the main base of the nation's industry, and which by themselves lack sufficient resources to support in-house research personnel and infrastructure. Strategically, this type of grant will help to increase the quantity and quality of Thai SME, as well as improve employment, and national competitiveness. Hopefully, this kind of research grant will also promote linkages and long term partnerships between university-based researchers with industry, and demonstrate that basic research could truly lead to applications, and is relevant and important for national development (see also Figure 4).

The outcomes generated by all the above funding activities of TRF Academic Division, have been encouraging, with close to 4,200 publications in ISI-cited international journals published since 1994, accounting for about 25 percent of the total international publications from Thailand. Researchers who have been supported by TRF Academic Division include those receiving 4 King's Scholarships, 23 Anandha Mahidol Scholarships, and those receiving many national and international awards, for example 25 out of 37 Outstanding Scientist Awards, 51 out of 63 Young Scientist Awards, 2 Mahidol-B. Braun Prizes, 1 UNESCO Science Prize, and 1 Fukuoka Asian Culture Prize.

As parting remarks, we would like to state our belief again that no developed nation can advance its applied

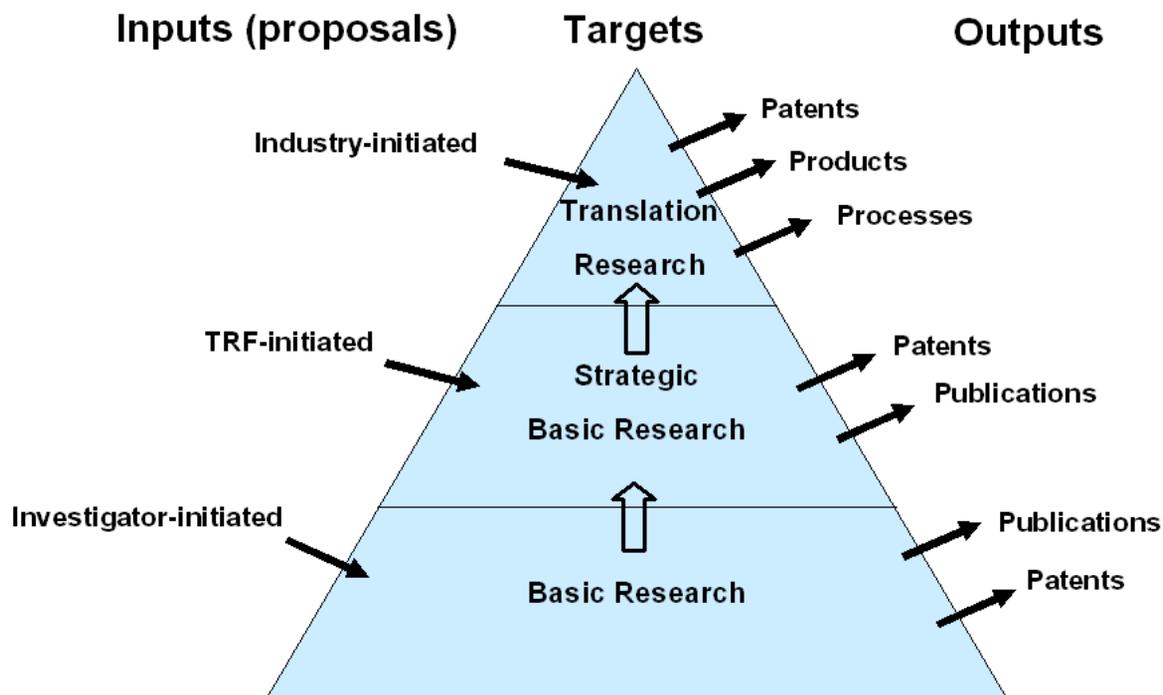
science without strong basic science. Each is actually "one side of the coin", and to make the research money earns its worth the government must commit to support both types of research. In addition, a strong political will, commitment of funding (as a definite percentage of GDP) to support research should be pledged by the government and the promise kept. These must be done to make research sustainable and yield results that can truly benefit the nation.

## ACKNOWLEDGEMENTS

This article is dedicated to the late Professor Sippanondha Ketudat, the first Chairman of TRF Policy Board, whose thought, devotion, and promotion of basic research in Thailand have inspired us all (see Figure 5). We also acknowledge the wisdom that spawned and guided our thoughts in writing this article from four Nobel laureates, quoted above, the first three of whom have visited Thailand.

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**Fig 4.** Scheme illustrating the continuity of basic research, strategic basic research and translational research, including how proposals are initiated and expected outputs.



**Fig 5.** Professor Sippanondha Ketudat with Professor Sheldon L. Glashow (Nobel Laureate in Physics, 1979).