



The Structure and Mechanism for Driving the National Research and Innovation Strategy

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ABSTRACT

The National Council on Research and Innovation Policy has formulated the National Research and Innovation Strategy (2018-2037) which is one of the key driving forces for achieving Thailand's 20-Year National Strategy and Thailand 4.0. The successful execution of this National R&I Strategy will depend on careful design of the structure and management mechanism. This qualitative research is based on the analysis of prior studies on the Thai and international research and innovation systems, as well as in-depth interviews of national experts on research and innovation strategies and management specialists, leading to PESTEL Analysis, SWOT Analysis and TOWS Matrix. The result of this study could be summarised as follow there must be clear coordination and division of organisation missions of R&D institution which should be classified into 5 groups; national R&I policy unit, funding agencies, research units, standards accreditation and testing units and users of R&I result. The characteristics and mechanisms for coordination among the key players in the R&I ecosystem are also outlined. Furthermore, in order to effectively implement the National Research and Innovation Strategy, the following measures could be readily performed. 1) Accelerate the formal approval of the National Research and Innovation Strategy (2018-2037) which is generated through participation of all relevant stakeholders, as the key national guideline on this issue. 2) Process the National Research and Innovation Act to become the main law governing the R&I system. This Act will provide the guideline on the organisation and functions of the main stakeholders. 3) Establish the National Council on Research and Innovation Policy, chaired by the Prime Minister, as the main policy council, together with the Office of the National Council on R&I Policy as the governmental department directly under the Prime Minister performing missions on policy recommendation, budget allocation, monitor and evaluate performance of key stakeholders and important programs. 4) Reorganise by integrating Funding agencies under the Office of the National Council on Research and Innovation Policy, in order to coordinate the policy into practice. 5) Reform and reorganize structure of the research and innovation organisations especially clarifying the organisation missions and key performance indicators and coordinate the functions to be aligned with national agendas. 6) Integrated budget system according the strategies outlined by the national agendas, by coordinating among the Office of the National Council on Research and Innovation Policy and the Budget Bureau. 7) Establish national research and innovation database for both information and management system. 8) Establish both hard and soft infrastructure for R&I, including standards, procedures and guidelines in compliance with international standards.

Keywords: Structure, Management Mechanism, Research and Innovation Strategies

Introduction

Research and innovation is a vital factor in driving Thailand's National Strategy and Thailand 4.0. However, there are certain important challenges hindering the development of various types of research toward the nation's economic and social prosperities that needed to be resolved. The National Research and Innovation Policy Council (NRIC) has already formulated a 20-year National Research and Innovation Strategy (2018 – 2037), through the joint efforts of its four sub-committees and the Research and Innovation System Reform Integration and Management Committee during the period of one year. However, the success of the reform in accordance with existing policies and strategies would rely on continuing implementation and joint mobilisation of the entire system and the intended reform toward relevant objectives would not be possible without any of the essential factors. Among them, the structure and mechanism for driving the National Research and Innovation Strategy are the key critical success factors. Therefore, the system management and organisation structure in order to execute all concerned strategies at all levels – from policy making, budget allocation for research and innovation and research operations to the utilisation of research results -- as well as the mechanism for the cooperation and interrelation among all concerned agencies, are vital to driving the National Research and Innovation Strategy toward its goals. Since many problems surrounding the nation's research and innovation circle have been overlooked for quite a long period, the further steps must be based on appropriate principles, guidelines and careful plans in both the structure and mechanism of management aspect of the national research and innovation agency. The Researchers

on behalf of the committee members and also in the joint secretariat of the National Research and Innovation Policy Council, would like to pick these issues as the topic of an in-depth research in order to give some recommendations which are practical enough for the nation's entire system. The study has also been focussed on the appropriate model in relation to the structure and mechanism for the management agency to drive the 20-year National Research and Innovation Strategy (2018 – 2037), in order to blend well with the national R&I strategy itself and the National Strategy entirely and for all concerned institutions are able to use the study results for their strategy management study and practice as guidelines for future improvement to make relevant strategies up to date and suitable for each era.

Research Objectives

1. To study and analyse the model of management structure and mechanism to drive forward the National Research and Innovation Strategy.
2. To propose an appropriate structure and management mechanism in driving forward the 20-year National Research and Innovation Strategy (2018 – 2037).
 - 1) Accelerate the formal approval of the National Research and Innovation Strategy (2018-2037), which is generated through participation of all relevant stakeholders, as the key national guideline on this issue.
 - 2) Process the National Research and Innovation Act to become the main law governing the R&I system. This Act will provide the guideline on the organisation and functions of the main stakeholders.

3) Establish the National Council on Research and Innovation Policy, chaired by the Prime Minister, as the main policy council, together with the Office of the National Council on R&I Policy as the governmental department directly under the Prime Minister performing missions on policy recommendation, budget allocation, monitor and evaluate performance of key stakeholders and important programs.

4) Reorganise by integrating Funding agencies under the Office of the National Council on Research and Innovation Policy, in order to coordinate the policy into practice.

5) Reform and reorganise structure of the research and innovation organisations especially clarifying the organisation missions and key performance indicators and coordinate the functions to be aligned with national agendas.

6) Integrated budget system according the strategies outlined by the national agendas, by coordinating among the Office of the National Council on Research and Innovation Policy and the Budget Bureau.

7) Establish national research and innovation database for both information and management systems. 8) Establish both hard and soft infrastructure for R&I, including standards, procedures and guidelines in compliance with international standards.

Scope of Research

1. The content scope of this research covers various management concepts, domestically and internationally, in order to drive forward the National Research and Innovation Strategy (2018-2037).

2. The population scope of the research

consists a total of 13 national and international academic experts on research and innovation system and on the formulation of R & I strategy driving structure and mechanism.

3. The time scope of the research is a period of seven months, from October 2017 to April 2018, for primary data and secondary data gathering and analysis.

4. The area scope of the research focuses on the structure and mechanism for driving the research and innovation in government agencies, plus some data in state enterprise and private sectors which would also play a role in the success of the government sector.

Literature Review

1. Related concepts, principles and theories

The literature review has been made on a variety of related concepts, principles and theories in the following documents:

- The concept of a national strategy;
- The concept of a national interest;
- The concept of Thailand 4.0 model;
- The 12th National Economic and Social Development Plan (2017 – 2021);

- The paper on Mobilisation and Integrative Reform Plan for National Research System and the frameworks of the 20-year National Research Strategy, by Deputy Prime Minister ACM Prajin Juntong, June 2016;

- National Council for Peace and Order's Announcement No. 62/2016 (October 6, 2016) on reform of national research and innovation system;
- The Progress Report of the Committee on Public Administration Reform, the National Reform Steering Assembly, on the Structural Reform of the Government Agencies in Science and Technology

(June 2017);

- The Report of the Committee on Science, Technology, Research, Innovation and Intellectual Property Reform, the National Reform Council, on "The Reform of National Science, Technology, Research, Innovation and Intellectual Property" (2015);

- The draft of 20-year National Research and Innovation Strategy (2018-2037) and

- The draft of National Research and Innovation Act.

2. Related researches on possible guidelines for research and innovation systems as the significant tools among policy making agencies for national economic and social development, as follows:

- The Knowledge and Research Management Strategies to Strengthen the Nation in accordance with the Government's Public – Private Collaboration Policy;

- Commercial Research Strategies for the Competitiveness of the Nation on international trade;

- Proactive Strategies for National Research Development to Strengthen Thailand and

- National Research System Reform.

Research Methodology

The research, entitled "The Structure and Mechanism for Driving the National Research and Innovation Strategy" is a qualitative research, with the following methods:

1. The Study of Secondary Data

The study of secondary data has been made through both domestic and international academic reports, the documents of several studies on related strategies conducted by

agencies and education institutes and websites of concerned agencies.

2. The Study of Primary Data

The primary data has been obtained from in-depth interviews of 13 specialised experts, based on the research objectives.

3. The Analysis of the Data on Structure and Management Mechanism

The analysis of data on structure and management has been made by means of content analysis, using PESTEL analysis as a tool to identify each factor and the interrelationship among these factors, with the help from SWOT analysis in pinpointing the weaknesses, strengths, opportunities and threats to reflect the problems and challenges in research and innovation management system and its variant TOWS Matrix in identifying critical success factors for such management system.

4. The Synthesis of Data for the Proposition of Structure and Mechanism for Driving the 20-year National Research and Innovation Strategy (2018-2037).

Research Results

In accordance with the first objective of the Research, which states "To study and analyse the model of management structure and mechanism to drive forward the National Research and Innovation Strategy", the results of the Research have been obtained from the case studies in United States, Britain, Japan, China, South Korea, Singapore and Malaysia, as follows:

Research Summary

The Structure of the Agencies for Driving the National R&I Strategy

- A policy council, directing the policies and directions of national research, is chaired by Prime Minister or President;
- A core agency to undertake national research policies and promote the guidelines and directions of the national research operations is under the supervision of the nation's leader as the agency is designed to prepare and manage national research policies, monitor the execution of national research policies, evaluate the results of the execution of national research policies and give recommendations to the administration at ministry level;
- A centralised research system, controlled by the government with ministries and agencies having clear responsibilities in relation to national research and
- A research funding agency responsible for funding research projects, which are complied with national research policy and directions, among specific research institutes and research centres under the ministries and both public and private educational institutes.

- Having a budgeting mechanism to induce private investment in research and innovation, with the utilisation of relevant mechanisms to prioritise research projects and to be able to directly allocate the budget to those research priorities, such as the cross-ministerial strategic innovation promotion programme (SIP);
- Having a mechanism to attract quality personnel from other countries and to find global research alliance for certain projects;
- Introducing some laws which would help promote the development of the research on science and technology, similar to the Bayh-Dole Act of the United States, which enables universities, non-profit research institutions and small businesses to own, patent and commercialise inventions developed under federally funded research programs within their organisations;
- Investing in continuous education and research and innovation database and
- Appointing a chief research advisor at ministry level in order to provide consultation for research projects within each ministry.

The Mechanism for Driving the National Research and Innovation Strategy

- Being jointly driven by national committees with clear responsibilities, consisting of an expert committee, a specific committee, a steering committee and a consultation committee;
- Formulating the strategies to drive and promote research operations in order to establish knowledge, innovation and economy foundation of the nation and also to promote efficiency and excellence of research projects in order that these quality researches can be further studied for long-term benefits;

From the analysis of the model of management structure and mechanism to drive forward the National Research and Innovation Strategy, the key findings have been, as follows:

- 1) Thailand already has a foundation to drive the National Research and Innovation Strategy at one level as there has been the establishment of some agencies whose missions are to support and propel any competitive research work and innovation of the nation; but there are still some obstacles. From the study, it has been found that after their operations these agencies seemed to

have eventually paid more attention to several works in accordance with the missions of their operating units and did not have any process to review their own missions. In addition, these agencies operate independently, without any specific form of mechanism in an effort to establish a platform for exchanging their opinions or to promote collaboration among concerned agencies. Although these agencies have also appointed their executives who are in other related agencies so that this different group of people can also play a role in giving useful opinions to them, there seems to be no genuine collaboration, causing Thailand to miss the opportunity to utilise the readiness of these agencies and the potential of the nation's researchers, who are highly recognised in international circles, as the driving forces of national research and innovation projects.

2) The existing structure of research operational units, accreditation and testing units and research result utilisation units, which should offer sufficient flexibility for operations and customer services, has become a big obstacle as these research related units are in fact in the vertical organisation structure of their ministries, resulting in unfavourable delay of the operations and still unable to find their own appropriate management patterns, such as in the financial management of the government sector.

3) There still lacks an appropriate channel for accessing the database in research and innovation system and for the provision of information on research and innovation for policy makers and the general public or research result users, due to the establishment of agencies with overlapping missions and the extension of work

scopes of these agencies beyond their missions which have apparently caused confusion and misunderstanding among the public that could possibly play an important role in giving useful information and some recommendations on the policy to the government sector.

4) In the past, the governments did not pay sufficient attention to the nation's research and innovation, causing a neglect of related research missions and several long standing problems in this field. Meanwhile, research related agencies and research and innovation funding agencies seemed to have failed to focus on seriously supporting the nation's research and innovation, resulting in a negative image of the investment in research and innovation of the nation.

5) The independence among research agencies has unfortunately induced individualism among the agencies while the lack of appropriate mechanism to form a substantial network and facilitate a cooperation among these agencies, from policy making to data gathering and management, resulting in the lack of an overall reliable database of the nation which can be utilised for decision making and relevant development of the nation's research and innovation ecosystem.

In accordance with the second objective of the Research, "To propose an appropriate structure and management mechanism in driving forward the 20-year National Research and Innovation Strategy (2018 – 2037)", the results of the Research have been, as follows:

Policy Making Agency

The policy making agency is a unit of the government which plays an important role in supervising all related units in research and

innovation system at different levels to move in harmony with the 20-year National Strategy (2018 – 2037), National Research and Innovation Strategy (2018 – 2037) and the budget management in accordance with the national strategies, as well as to monitor and evaluate all research and innovation projects and to report the status of national research and innovation to the government in order to ensure that there would be the mechanism to substantially drive the national strategies. The policy making agency should be in the form of a council or a principal committee, with an expert committee, a budget management committee and special committees for each strategy to help drive all policies to successful operations.

Research Funding Agency

The research funding agency is a unit which promotes the strength in research operations, enhances the cooperation among all concerned parties and decentralises decision making process for research project funding vertically. Moreover, there should also be chief research advisors in each ministry in order to be directly responsible for research and innovation development of each ministry, as well as to closely cooperate and formally have their meetings from time to time and also to formulate the strategic research and innovation plans for every five year period with a focus on the promotion of cooperation among all concerned parties.

Research Operations Agencies

The research operations agencies are the units in the government sector and ministries, educational institutes, the private sector and public organisations, undertaking research

operations, jointly developing networks for advanced research work and promoting innovation out of research results.

Standard Accreditation and Testing Agency

The standard accreditation and testing agency is responsible for setting the standards of products, certifying products, providing knowledge and technology transfer to any agency or organisation in the government sector and ministries, educational institutes, the private sector and public organisations which has the potential of joining large projects and the goals in absorbing and utilising such technology for further development and also for developing the infrastructure standards and management of intellectual property.

Research Result Utilisation Agency

The research result utilisation agency is responsible for encouraging the participation of all concerned parties in the development of research questions and innovation which would promote significant effects for national economic and social development, the co-investment in the researches, and the appropriate marketing and knowledge management in an effort to utilise relevant research results for further stages of development.

Research Result Discussion

The transformation of strategic policies and recommendations into practices has six main points for consideration, as follows:

1. Macro-level Mechanism

At the macro level, the National Research and Innovation Policy Council is responsible for driving strategic proposals to become urgent issues

for implementation and the transformation of research and innovation strategies into programmes of work and projects in all concerned agencies, as well as monitoring the progress of all relevant operations and evaluating the operational results before reporting to the government and informing the general public.

2. Micro-level Mechanism

At the micro level, all concerned agencies in formulating operational plans in relation to strategies, budget, personnel, infrastructure, data and information, laws and other enabling factors must cooperate with each other in order to encourage the participation and collaborative partnership in organising relevant events and working on related projects, especially those in line with strategic policies and proposals to be reported to the National Research and Innovation Policy Council.

3. Mutual Agreement on Structure Adjustment

For the agencies with similar missions on research and innovation, there should still be some adjustments in their roles to better become the driving forces of the 20-year Research and Innovation Strategy (2018 – 2037), especially, the policy making agencies whose functional structures and organisation management system should be reviewed and adjusted in order to offer more flexibility and efficiency in their operations while their operation reporting system be adjusted for better cooperation and collaboration among all concerned agencies.

4. Transition Plans

In the beginning, there should be the establishment of an ad hoc committee to formulate the collaborative framework for all concerned agencies in the government sector in order to facilitate the role and productivity adjustment of

these agencies, consisting of the representatives from the Office of the Civil Service Commission, the Office of the Public Sector Development Commission, the Office of the National Economic and Social Development Board, the Budget Bureau and all five levels of the National Research and Innovation Policy Council. The committee is responsible for arranging clusters in accordance with the missions of concerned agencies, defining major and minor roles of all concerned agencies with operational goals and transforming individual operations into collaborative operations.

5. The Review and Improvement of Laws in Relation to Concerned Agencies

The laws in relation to concerned agencies should be reviewed and improved in order to be in harmony with their operations to better serve all goals of the 20-year National Research and Innovation Strategy (2018 – 2037), with a focus on the preparations for any disruption and the development of hybrid organisational structure.

6. The Development of Linking Mechanism and Cooperation Enhancement Mechanism for Research and Innovation

The linking mechanism and cooperation enhancement mechanism can be developed in the form of a committee and an exchange of information among all concerned agencies through the utilisation of information technology or relevant operations and modern budget management.

Recommendations

1. Recommendations for the utilisation of research results

1.1 To drive the 20-year National Research and Innovation Strategy (2018 – 2037), which has been formulated by the participation among all

concerned parties and endorsed as the nation's framework for future development of research and innovation that can be further developed for commercial purposes and the capability enhancement of manufacturing and service sectors, as well as for solving the problems of social development significantly.

1.2 To accelerate the legalisation of the Research and Innovation ... B.E., whose draft has already been drafted, to be endorsed by the Cabinet and the National Legislative Assembly, as soon as possible.

1.3 To establish the Office of the National Research and Innovation Policy as a new agency under the supervision of the Prime Minister to collaborate with all concerned agencies and drive the policy of the government to relevant agencies in different operational systems and to work closely with the Budget Bureau on budgeting management for national research and innovation to be in line with the supervision and collaboration policies of the government to drive concerned policies towards fruitful execution and also to manage research and innovation database for monitoring and evaluation.

1.4 To establish a research funding agency under the management of the Office of the National Research and Innovation Policy. However, the research funding agency should be a public organisation or an established fund in order to be able to efficiently fund specialised research projects and also have the agility in the management and promotion of research results for the development of end products.

1.5 To restructure the agencies in research and innovation system both vertically and horizontally in order to establish a clear linkage

among these agencies in relation to the national agenda and be in harmony with each other on the policies, budget allocation and research operations, enabling their monitoring and evaluation work to run smoothly under the role and independence of each agency to accomplish its mission toward mutual goals, no matter they are in the government sector, higher education institution, private sector or civil society.

1.6 To develop a integrative budgeting system for research operations, an infrastructure for research and innovation and the nation's research and innovation personnel development plan, with the National Research and Innovation Policy Council, which is chaired by the Prime Minister, undertaking the budget allocation for research operations in order to be in line with the development goals of the 20-year National Strategy (2018 – 2037).

1.7 To develop a central database system and data and information management system, the nation's research and innovation index and a linkage for national and international data system, with a core agency responsible for linking all relevant policies together before mobilise them for execution by operational units.

1.7 To create the standards, regulations and guidelines in relation to national research and innovation, as well as research ethics, to meet international standards and then monitor and control to ensure the compliance.

2. Recommendations for future researches

There should be further studies on the goals of each strategy in accordance with the 20-year National Research and Innovation Strategy (2018 – 2037), in order that each strategy can be developed into action plans and achieved within its timeframe.