Science, Technology and Innovation Policies and Strategies Development in Developing Countries

Editor

Zakaria Fouad Fawaz Hassan Abdalla

Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre)

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About the Centre

The Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) is an inter-governmental organisation with a membership of 47 countries spread over Asia, Africa, Middle East and Latin America. Besides this, 11 S&T agencies and academic/research institutions of Bolivia, Brazil, India, Nigeria and Turkey are the members of the S&T-Industry Network of the Centre. The Centre was set up in 1989 to promote South-South cooperation through mutually beneficial partnerships among scientists and technologists and scientific organisations in developing countries. It implements a variety of programmes including international workshops, meetings, roundtables, training courses and collaborative projects and brings out scientific publications, including a quarterly Newsletter. It is also implementing 7 Fellowship schemes, namely, NAM S&T Centre Research Fellowship, Joint NAM S&T Centre – ICCBS Karachi Fellowship, Joint CSIR/CFTRI (Diamond Jubilee) - NAM S&T Centre Fellowship, Joint NAM S&T Centre – ZMT Bremen Fellowship, Research Training Fellowship for Developing Country Scientists (RTF-DCS), NAM S&T Centre – U2ACN2 Research Associateship in Nanosciences and Nanotechnology and Joint NAM S&T Centre – DST (South Africa) Training Fellowship on Minerals Processing and Beneficiation in Indian institutions. These activities provide, among others, the opportunity for scientist-to-scientist contact and interaction, training and expert assistance, familiarising the scientific community on the latest developments and techniques in the subject areas, and identification of technologies for transfer between member countries. The Centre has so far brought out 74 publications and has organised 104 international workshops and training programmes.

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— *Editor* —

Prof. Zakaria Fouad Fawaz Hassan Abdalla

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Foreword

In this globalization era of the knowledge economy, Science, Technology and Innovation (STI) have become the key drivers of rapid socio-economic development; and S&T has thus become a critical input required for the development agenda of any nation. STI is a means to explore new and efficient ways of doing things in the competitive environment having significant impact on economic progress. The rapid pace of technological advances offers a big challenge to all the economies. The social and economic status of a country is influenced by the economic policies of its government, and in present situation, it requires integrating science, technology and innovation in the strategy for development of a nation. Any kind of developmental policy of a country is very specific to the nation depending upon its vision, resources and requirements. The planning and execution of science and technology policies for the economic development is very important for all the nations, but more so for the developing countries with meagre or limited resources. The role of policy makers thus becomes very crucial to put certain directions;wherein science, technology and education can be used in more effective and efficient ways in the key sectors so as to maximize the benefits of their efforts for the economic development on a sustainable basis.

Countries need to develop and implement their sound science, technology and innovation (STI) policies. It is also important to recognize that the effective STI policies are directly linked with the quality of science education and the system at school level, which has enormous impact on the future citizens- scientists, researchers, innovators, policy makers, politicians. It is globally recognized that implementation of Inquiry Based Science Education (IBSE) is an inspiring way of learning science, and STI policy makers must consider adoption of IBSE methodology in order to boost the national innovation capacities on sustain them. There is a need to learn and share from each other's experiences amongst the developing nations; thus the South-South Cooperation is crucial, and its strengths have been successfully demonstrated by numerous institutions in Asia and the Pacific Region.

Keeping in view the significance of Science, Technology and Innovation Policies for the economic development with particular reference to South-South Cooperation, I am delighted to note that the Centre for Science and Technology of the Non-aligned and other developing countries (NAM S&T Centre) in partnership with the International Science, Technology and Innovation Centre for South-South Cooperation under the auspices of UNESCO(ISTIC) in Kuala Lumpur, Malaysia; Ministry of Science, Technology and Innovation (MOSTI) of Malaysia; United Nations Education, Science and Cultural Organization (UNESCO); and Islamic Educational Scientific and Cultural Organization (ISESCO) organised an International Training Programme on STI Policy and Management for Developing Countries in Kuala Lumpur, Malaysia on 8–12 August 2016 to provide technical support to member states in developing policies and programmes as well as their implementation in accordance with their own specific needs. This book is the compilation of 13 papers presented by the participants of the Training Programme from 12 countries and provides the status of STI Policies and implementation in those countries.

I compliment the NAM S&T Centre for taking up the initiative on such a vital issue of Science, Technology and Innovation Policy making, especially for the developing countries and bringing out this valuable publication. I am confident that the book will be an asset to the policy makers, researchers, international organizations, NGOs and all others associated with STI policy implementation activities in developing countries, especially in the member states of the NAM S&T Centre. It would be interesting for NAM S&T Centre however, to undertake a structured follow-up study on the status of STI policies and their implementation in some of the participating countries, five years on (say in year 2021), taking the status presented in this book as the "baseline". The outcome of that study would determine the weaknesses and impediments to STI policy development and implementation/ management. NAM S&T Centre and ISTIC can then organise a special STI Policies meeting of the countries participating in the study.

Prof. Dr. Manzoor Hussain Soomro

President,

ECO Science Foundation (ECOSF)

Preface

Science, technology and innovation (STI) are key drivers of economic and social development. The experience of successful developing countries shows that STI policies that are well integrated into national development strategies and combined with institutional and organizational changes can help raise productivity, improve firm competitiveness, support faster growth and create jobs.

To achieve this, policies need to address the specific features of innovation in developing countries. The developing countries work in STI policy for development focuses on supporting the integration of STI in national development strategies and building-up STI policy-making capacity in developing countries.

Science, technology and innovation have been at the core of all major development advances in the last 50 years, but meeting tomorrow's development challenges will require long term investments in both research and capacity building efforts to promote sustainable innovation in developing countries. In today's world, innovation can no longer be exported. For donors, this means strategic partnerships with private sector, innovative financing, and a broad recognition of the ability of actors in developing countries

Beyond the impact that Science, Technology and Innovation (STI) have for creating knowledge based economies, they may also contribute to social and ecological dimensions of development. This would require beneficial STI policies to be in place. While authors have studied STI impacts, scientific overviews of the entire range of possible impacts of STI and its policies in the developing countries. In this book on "Science, technology and innovation policies and strategies development in developing countries" – an overview of concepts and corresponding policies" we therefore present different scientific models and conceptions of how STI contribute to different aspects of development in more than ten developing countries in the world wide. After a first introduction to STI in the context of development and the role of policies, we group scientific models and conceptions into three ideal-type categories: STI for economic development, STI for sustainable development and STI

for inclusive development. In addition to outlining underlying scientific concepts, we focus on the recommendations for STI policies in development in the developing countries. In the concluding section, we discuss the role of the STI policy models issued by international organisations and discuss how far they are transferrable to developing countries.

Actually, we have written this book to help people understand how science can contribute to international development. People interested in international development often have very different views about the value of science. So, this book is a key to know some see science, technology and innovation providing the principal means for reducing poverty, eliminating disease and improving wellbeing.

Special thanks go to NAM S&T Centre for overseeing production and shepherding the book through the publication process.

Prof. Zakaria Fouad Fawaz Hassan Abdalla

National Research Centre, Egypt

Introduction

In this present globalised era of knowledge economy, Science, Technology and Innovation (STI) process has become the basis of development agenda of the nations. The role of STI is well recognised in bringing about the transition of relatively lower end economic performance into high value added activities. In this scenario, the governments and industry professionals as well as those in non-governmental organisations in a large number of developing countries face problems in meeting the challenges from the fast pace of technological changes, whereas for designing the blueprints and strategic implementation frameworks to provide a planned transformation within countries and organisations, it is absolutely critical to have experts who understand the dynamics of science and technology within the context of economic and market development.

Keeping in view the importance of STI Policy for the economy of developing countries, the Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre) organised two programmes in the series. First, an international workshop was organised in association with Technology Studies Institute of the Presidency of the Islamic Republic of Iran on 'Science, Technology and Policy Making for Developing Countries' during 28th November – December 2014 at Kish Island, Iran.

Subsequently, the NAM S&T Centre in partnership with the International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC), Malaysia under the auspices of the United Nations Education, Science and Cultural Organization (UNESCO) and support of the Ministry of Science, Technology and Innovation (MOSTI) of Malaysia; UNESCO; and the Islamic Educational Scientific and Cultural Organization (ISESCO) organised an International Training Programme on STI Policy and Management for Developing Countries (ITPS) in Kuala Lumpur, Malaysia on 8–12 August 2016. This programme brought various stakeholders, *viz.* scientists, experts and professionals from various countries with emerging economies together to hone up their skills on STI Policy. The main objective of the

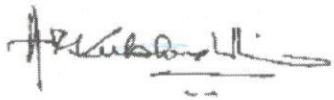
training programme was to impart necessary knowledge and skills to participants in the development and management of a national STI policy in support of social-economic transformation.

The Training Workshop was attended by 29 senior professionals from 23 NAM countries, including Bangladesh, Cambodia, Cuba, Egypt, India, Indonesia, Iran, Iraq, Myanmar, Nepal, Nigeria, Pakistan, Palestine, Saudi Arabia, South Africa, Sri Lanka, Sudan, Suriname, Tajikistan, Uganda, Venezuela, and Zimbabwe and the host country Malaysia. The training lectures were given by two eminent resource persons - Academician Tan Sri Datuk Dr. Omar Bin Abdul Rahman, Former Science Adviser to the Prime Minister of Malaysia and President/CEO, Malaysia University of Science and Technology (MUST) Ehsan Foundation and Mr. Adznir Mokhtar, Group Managing Director/ Co-Founder and Principal Partner, PRIMA Asia Pacific Consulting (PAPC) Sdn Bhd, Kuala Lumpur.

The present publication comprising 13 papers from 12 countries is a follow up of the above training programme based on the papers presented by the participants on various dimensions of STI policy of their respective countries.

I gratefully acknowledge the involvement and efforts of Prof. Zakaria Fouad Fawaz Hassan Abdalla for technical editing of this publication. I also greatly appreciate the valuable services provided by the entire team of the NAM S&T Centre, with specific mention of Dr. (Mrs.) Kavita Mehra, Mr. M. Bandyopadhyay, Ms. Rashmi Srivastava and Mr. Pankaj Buttan in compiling the manuscripts, liaising with the authors, cover page designing, proof reading, formatting and taking all the necessary actions in giving a shape to this book.

I am sure that this book will be useful to researchers, planners, Government officials and non-governmental organisations of the developing countries who are currently engaged in the formulation, evaluation or execution of STI policy of their countries.



Prof. Dr. Arun P. Kulshreshtha

Director General,

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Contents

Chapter 3

Science, Technology and Innovation in Indonesia

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ABSTRACT

As a developing country, it is realized that resources for development and promoting science and technology are very limited and that it is not possible to pioneer major scientific discoveries or inventions in all aspects of science and technology spectrum. But, it is possible to put certain direction in which science and technology can be used in more effective and efficient in the key sectors of economic development. In this matter there is a strong relation between development process and the application of science and technology in the production of goods and services. During Dr. H. Susilo Bambang Yudhoyono, The President of the Republic of Indonesia, responded to this challenge by establishing, among others, a National Innovation Council (KIN) on June 15th 2010. KIN – an independent group of 30 prominent citizens who are directly appointed by the president – is expected to boost innovation by: 1) providing "**out of the box but within the system**" recommendations on innovation policy; 2) enhancing inter-sectoral collaborations among innovation actors; and 3) monitoring the implementations of government innovation policies. In this paper we try to explain what has been done during that period and provide some policy recommendation to the President as part of the KIN main job. With the elected new President of the Republic of Indonesia in 2014, KIN has also been dissolved. The new President then launches Nawacita the new initiative under the President of Joko Widodo.

***Keywords**: National innovation committee, Initiatives 1-747, Indonesian innovation policy, Nawacita.*

Introduction

Globalization and Innovation have changed the constellation of the world's geostrategic economy, which many emerging economic countries as the new leaders of the world economic growth. Even prior to the 2008 global financial crisis, the epicentrum of world economy had been slipping away from the USA and Europe to Asia. Many Asian countries such as Japan, South Korea, Singapore, Taiwan, China and India have prepared themselves to enter the new era of innovation driven economy, and taking charge at the global stage. Indonesia – the only ASEAN country to be selected as a member of the G20, the Global Economic Steering Committee, and member of MIST (Mexico, Indonesia, South Korea and Turkey) the new world's economic axis – has a serious potential to become one of the great economic, if this country expands its competitive edge through science and technology development. This is a challenge as well as a golden opportunity for Indonesia. To date, however, Indonesian economic growth is still heavily relying on the exploitation of its natural resources, which explains the lower competitiveness of Indonesia as compared to its neighboring countries (Malaysia, Singapore, *etc.*). This country needs a new paradigm to the one that involves science and technology to produce innovation as a new growth engine.

Indonesia has the comparative advantage of the only maritime continent in the world, with about 13,000 islands and 70 per cent surrounded by the sea, which covers a total area of about 5.8 million km^2 of sea water. What does it mean, a maritime continent located in the equator? In simple words: It is an area with abundant sun light and precipitation, surrounded by sea. The combination of these three elements makes the Indonesian archipelago an unsurpassed paradise on earth. It has the richest biodiversity of combined marine and terrestrial organisms. From energy point of view: Indonesia is abundant in resources of renewable energy, such as wind, solar, a variety of bio energy sources, geothermal (the largest reservoir in the world, due to its location near the Ring of Fire belt), tidal wave, *etc.* For example, the Indonesian Association of Oceanic Energy (ASELI – *Asosiasienergilaut Indonesia*) predicts that Indonesia has about 49 Gigawatt of energy from tidal power and wave energy. All of these resources are waiting for the creative hands and minds of this nation to come up with their innovations to utilize all these blessing, sustainably.

Furthermore, Indonesia has a mega marine biodiversity, with about 35,000 species of marine biota, 910 species of corals, which is 75 per cent of world species, 13 species of sea grass which is 20 percent of world population, 682 species of sea weeds, 2500 species of mollusks, 1502 species of crustacean, 745 species of echinoderms, 6 species of turtle, 29 species of whales dolphins and more than 200 species of fish. This richness is the golden wells of biotechnology industry that again, awaiting the creative and innovative hands of young scientists and entrepreneurs to develop them for the welfare of our people.

Science and Technology Development Policy in Indonesia

The question of scientific and technological development in Indonesia has a central role in the general debate on the country's economic development strategy, whether in policy-oriented discussions, in academic consideration or in discussions

in the public and political arena. However, compared to several other hot issues like corruption scandals, political struggles and other contentious issues, science and technology is the subject of a rather silence interest to be discussed. Nevertheless, some political supports from many strands of public and political opinion agreed that science and technology development is one of the most important key elements to develop national economic growth. This element of innovation would significantly increase Indonesian economic growth by 2025, as depicted in Figure 3.1. The role of science and technology innovation not only envisage beyond an instrumental view of science and technology in purely economic development of a nation, but also indispensable to the development of a new ethos and new world view that would increase rationality and critical attitude.

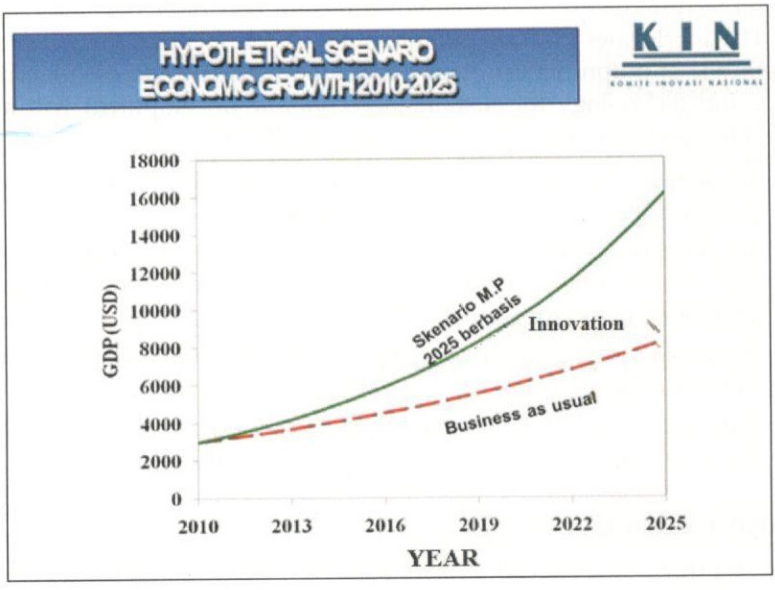

Figure 3.1: A Hypothetical Scenario of Indonesian Economic Growth. (National Innovation Committee of Republic of Indonesia 2011).

Indonesian economic growth without innovation (business as usual) will only achieve a GDP of less than USD 8000 (red line). On the other hand, with science, technology and innovation, Indonesian economic growth is predicted to reach its maximum potential and sustainable, achieving about USD 16,000 of GDP in 2025 (blue line). Thus, the area between the two lines is where science, technology and innovation contribute to the future of Indonesia economic power.

Therefore, a realistic science and technology policy to increase innovation capabilities in Indonesia should reflect the key role that science and technology will play in bringing about rapid socio-economic development and subsequent realization of self-reliance. The important role played by science and technology in socio-economic development in Indonesia has been recognized. Since the Independence, Indonesia has established a number of science and technology

research and development institutes as the main spearheads to boost socio-economic development thorough research in S&T. The peak of this achievement was the launched of N250, an-airplane that was built purely by Indonesian engineers, in Indonesia. Unfortunately, an economic turmoil in 1998 had crippled Indonesian science and technology development, one of the reasons was through agreement set by the IMF.

A firm national science and technology policy is very important in order to orient the use of science and technology toward economic, social and political objectives of the nation. Thus one primary function of National Innovation Committee of Republic of Indonesia (KIN) is to establish priorities of programmes for generating new knowledge and to determine strategies for the application science and technology to produce innovations for economic development of the country. These priorities then are put into policy recommendation to the President of the Republic of Indonesia for further consideration. The successful application of science and technology for sustainable economic development will need the strength of the endogenous and indigenous capability through:

a. Investment in human resources with the focus on capability to develop new science and technology in Indonesian soil
b. Investment on applied research with priorities to national development like Master Plan for the Acceleration and Expansion of Indonesian Economic Development(MP3EI)
c. Increasing foreign direct investment with the regulation on the transfer of technology
d. Solving problem in key economic, productive, incentives, regulation and social welfare sectors such as industry, agriculture, energy *etc.*

Innovation Initiative 1-747

Learning from the past and current state of Indonesian national S&T policy, KIN has identified that to move toward an innovation driven nations, Indonesia needs to solve the missing puzzle in its national development plan, that is the absence of a National Innovation System, as the road map to guide and guard national programs, toward the achievement of Indonesian vision of sustainable economic growth through innovation. The fundamental targets are to strengthen each components of the innovation ecosystem, which are: Funding, Leadership, Policy, Education, and Culture. All of these were compiled in a recommendation called **Innovation Initiative 1-747** to the president of the Republic of Indonesia. **One** is One percent (1 per cent) of the GDP for R&D in 2015; **Seven** is the seven steps to improve the ecosystem of innovation to boost innovations; **Four** is the four models of innovation based industrialization vehicles to accelerate economic growth; **Seven** is the Seven targets of Indonesian vision 2025, toward a sustainable development of Indonesia (Figure 3.2).

Science and Technology policy formulation is only meaningful if certain critical factors which lead to smooth implementation are considered. There are always gaps between declared objectives and the actual implementation of such objectives.

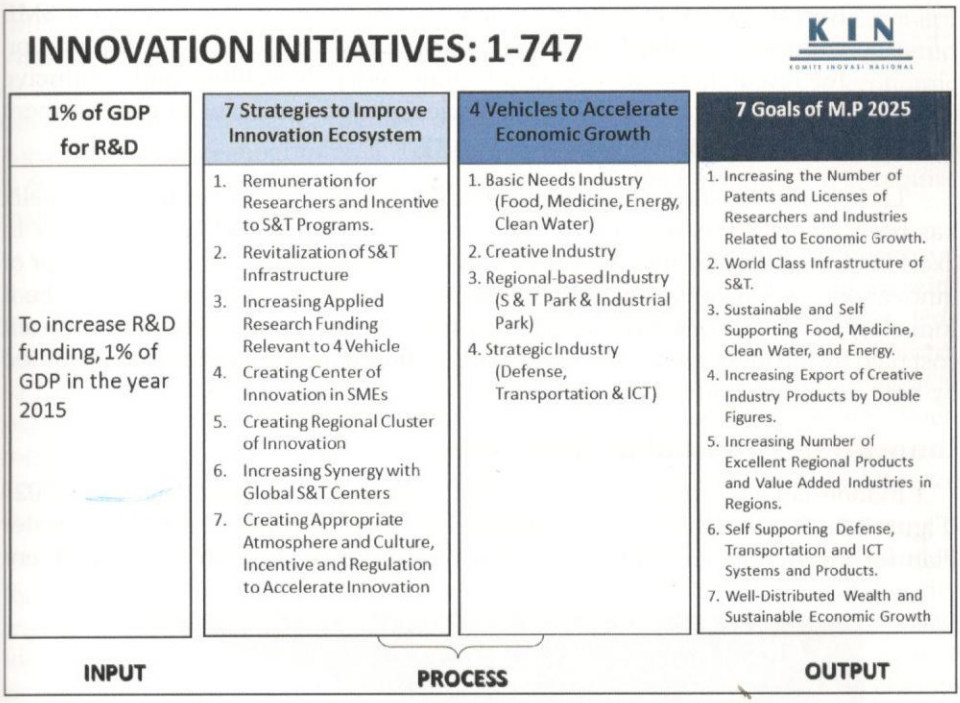

Figure 3.2: Innovation Initiative: 1-747. The recommendation by the Indonesian National Innovation Council (KIN) as strategic steps to Maximize the innovation capabilities of Indonesia.

Among others the gaps include poor education, low level of supported infrastructure for science and technology systems, very low level of R&D budget, weakness in coordination, operational instrument and lack of support and appreciation to the researchers in national development by the government. Lack of appreciation can lead to poor motivation, lack of participation by stake holder, weak incentives and regulation measures to promote demand for local supplied science and technology products. Failure to invest in research now may result in diminished economic growth in the future, a setback that cannot be reversed instantly.

The strategies are to enable research and development to play a more significant role in implementing science and technology which consist of two approaches:

- ☆ Input mechanism is the availability of adequate financial resources allocation to develop research activities ensuring a proper financial scheme to balance expenditure of research on one hand and development on the other hand, since both activities are very important for innovation. KIN has proposed to the government to increase R&D expenditure up to 1 per cent of GDP by the year 2014 to boost innovation.
- ☆ Process mechanism which is revitalization on innovation ecosystems which includes strengthening of adequate regulation framework, adequate

mental targets are to strengthen

human capital movement, establish innovation center to support SME company, establish regional cluster, provide attractive remuneration for researchers, increasing adequate research facilities and conducive environment to motivate good scientist and technologist making them give their best service to the country.

Lack of synergistic collaborations among the components of the triple helix has been identified as one of the main issues hampering Indonesia's ability to excel in innovation. As often reported in many developing countries, each actor of innovation plays its own role with minimum interactions with other actors: be it Industry, Academia or Government. This fundamental problem has a significant cost paid by the innovators, since it affects the amount of R&D funding contributed by both public and private sectors.

Innovation Potential of Indonesia

Indonesian government has set a goal to become a developed nation by 2025 (Figure 3.3). To reach this goal, government has launched what so-called the Master Plan for the Acceleration and Expansion of Indonesian Economic Development

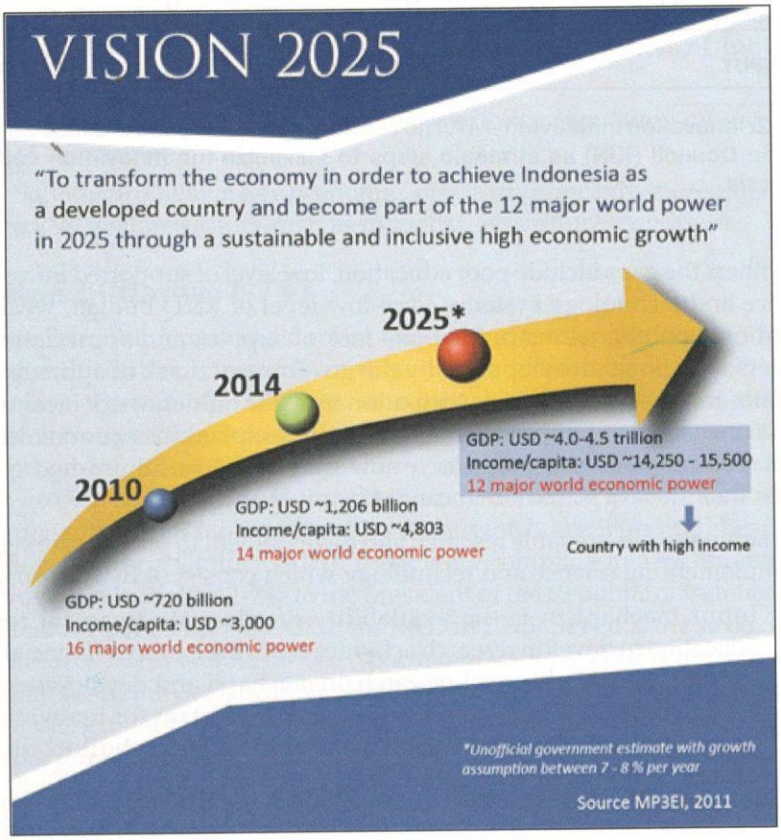

Figure 3.3: Indonesia Vision 2025.

(MP3EI), as a complementary to the existing Long-term National Development Plan (RPJP). There are eight main programs and 22 economic activities registered in Master Plan, which are the strategic sectors of Indonesia's future economic development: These eight programs are: 1. Manufacturing Industry, 2. Mining, 3. Agriculture, 4. Oceanography, 5. Tourism, 6. Telecommunication, 7. Energy, and 8. Strategic Regional Development. Certainly, all of these programs will require major investments, both nationally and internationally.

This plan is supported by the huge comparative advantages of Indonesia. Indonesia is the emeralds of the equator. It is among the very few countries with the most culturally diverse and biologically rich environment in the planet. This beautiful archipelago spans 5000 km^2 95° East to 141° East, and 2000 km^2 6° North to 11° South. Uniquely, most areas of this archipelago are covered with water (70 per cent, or about 3.2 million km^2), with only 2 million km^2 of terrestrial area. Even more interesting is that all of the bodies of water connecting islands within this archipelago are relatively much shallower than the oceans surrounding it. Hence it is called the Maritime Continent, the only one in the world.

As the only Maritime-continent country in the world, KIN recommended that Indonesia should prioritize its R&D on the following areas: 1. Food security (*e.g.* commodity nursering, organic fertilizer, *etc.*), 2. Energy security (*e.g.* solar, bio ethanol, geothermal, *etc.*), 3.Biotechnology, 4.Transportation and Defence technology, 5. Deep fisheries and processing, 6. Earthquake, tsunami and climate (natural disaster management, man-made rain, *etc.*), and 7. Knowledge-based products (electronics, advanced materials and nano technology).

The Indonesian New Era

In the year 2014, President Jokowi Widodo and Vice President Jusuf Kalla have been elected to be the 7th President of Indonesia. The National Innovation Committee which was established during President Susilo Bambang Yudhoyono and serve during his Presidency has also been dissolved. President Joko Widodo and his government later established an Agency for Creative Economy which mainly for economic development through creative economy and tourism. Additionally the new government launches their program which named as Nawacita as shown in Figures 3.4 and 3.5. The development stress on building infrastructure which for a long run will be beneficial for Indonesian economic development.

Conclusion

As a developing country, Indonesia has a long history to develop its economic development through the implementation of science, technology and innovation as the main driver for economic growth. A number of efforts have been put forward with different initiatives. However, due to the lack of firm innovation policy and political support to establish STI as the main driver for economic development, the Indonesian innovation landscape and therefore the economic development is still depend heavily on selling raw materials rather than innovation based technology products. The need to have Innovation Councils as a Presidential instrument to guide the way of Indonesian Innovation is very important. This council can

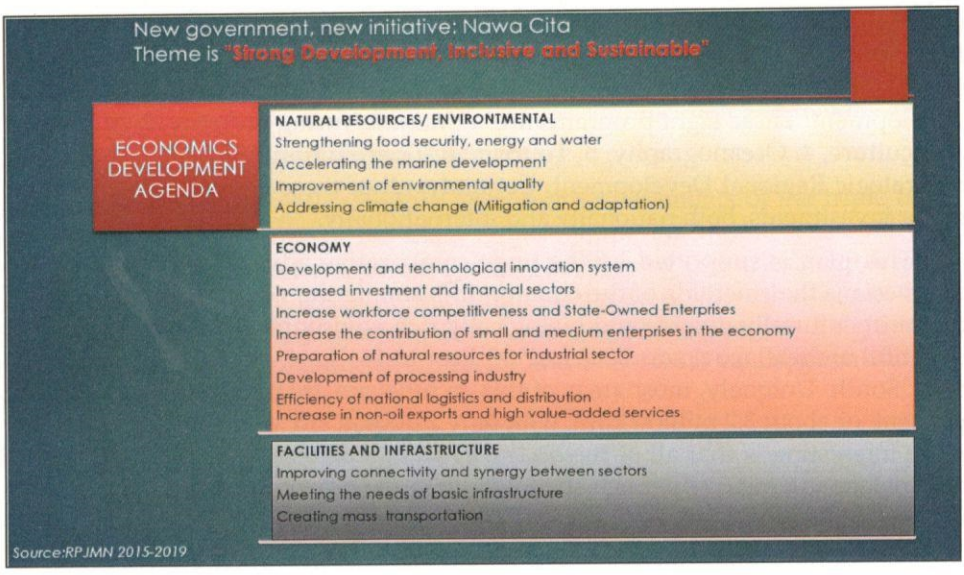

Figure 3.4: The New Indonesian Government Initiative, Nawacita (Fadil Hasan, Indonesian Economic Outlook 2015).

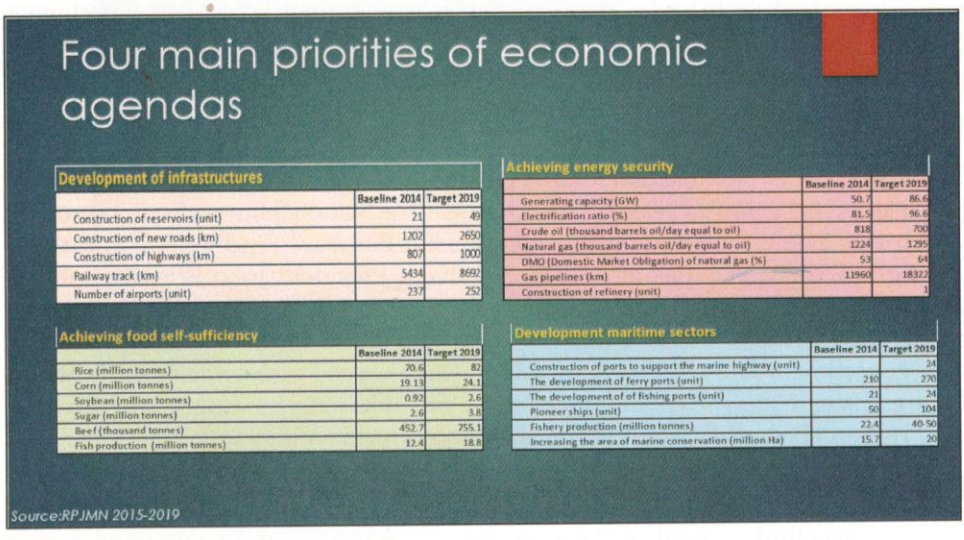

Figure 3.5: The Economic Agenda for Indonesia (Fadil Hasan, Indonesian Economic Outlook 2015).

gives the President their policy recommendation for innovation that can result in sustainability on economic growth.

References

1. The Master Plan for the Acceleration and Expansion of Indonesian Economic Development (MP3EI), 2012.
2. Hidayat Yorianta, Vanny Narita, Ary Syahriar, Ahmad H Lubis et.al, Inovasi 1-747, Program Strategis Inovasi Indonesia, KIN 2014.
3. Edquist, C and Hommen, L (Editors). 2008, Small Country Innovation Systems: Globalisation, Change and Policy in Asia and Europe, Chelteham: Edward Elgar.
4. Ministry of Energy and Mineral Resources, Republic of Indonesia 2012. Handbook of Energy and Economic Statistics of Indonesia.
5. Fadil Hassan, Fadil Hasan, Indonesian Economic Outlook 2015.
6. OECD. 2010. The OECD Innovation Strategy: Getting a head start on tomorrow, Austria OECD.
7. Zuhal 2013, Gelombang Inovasi Indonesia, PT. Gramedia Pustaka Utama.