

## BAB 2

# Sains dan Teknologi di Indonesia: Beberapa Analisis Struktural

Soewarsono & Thung Ju Lan

Pengembangan sains dan teknologi di masa rezim pemerintahan yang lalu, khususnya rezim Orde Baru, tampak dari ditunjuknya Habibie sebagai Menristek untuk mengembangkan teknologi canggih di Indonesia<sup>1</sup>. Akan tetapi, seperti yang kita tahu, rezim Orde Baru “gagal” mengembangkan sains dan teknologi sebagaimana yang tampak dari hancurnya industrialisasi di akhir pemerintahan Presiden Soeharto ketika krisis keuangan melanda Asia.

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<sup>1</sup> Seperti dikatakan Sulfikar Amir, “*Since the private sector would take a long time to adopt technological innovations produced by BPPT, quick measures to develop national capacity in technological growth were placed on state-owned industries. This was the rationale behind the decision to form the Managing Agency for Strategic Industries (BPIS), which constituted another pillar of the New Order technological state and a venue for Habibie to cultivate a small group of leading high-tech-oriented industries*” (Amir, 2013, 78–80).

Soewarsono\* & Thung Ju Lan

\*Purnabakti Peneliti Senior LIPI, e-mail: soewarsono@yahoo.com

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Soewarsono & Lan, T. J. (2024). Sains dan Teknologi di Indonesia: Beberapa Analisis Struktural. Dalam Lan, T. J. (Ed.), *Sains dan Teknologi dalam Konteks Kultur* (13–31). Penerbit BRIN. DOI: 10.55981/brin.853.c689, E-ISBN: 978-623-8372-91-1

Tulisan ini mencoba membahas kegagalan tersebut dari perspektif sejarah serta *science, technology, and society* (STS). Kajian yang dilakukan Sulfikar Amir (2013) dalam *The Technological State in Indonesia: The constitution of high technology and authoritarian politics*—sebuah buku yang didasarkan pada “*a doctoral dissertation at the Department of Science and Technology Studies, Rensselaer Polytechnic Institute*” (Amir, 2013, xiii)- menunjukkan kepada kita satu hal penting yang harus digarisbawahi ketika membandingkan eksistensi sains dan teknologi di Indonesia di bawah Orde Baru dengan East Asian states—tepatnya Jepang dan Korea Selatan. Menurutnya, berbeda dengan negara-negara Asia Timur yang menurut studi ekonomi politik, “Mempunyai kemampuan untuk mengarahkan sektor-sektor swasta untuk masuk pada proses industrialisasi yang cepat dengan produktivitas tinggi di mana inovasi merupakan bagian dari investasi bisnis”; di Indonesia, pengembangan sains dan teknologi untuk tujuan industri selama masa Orde Baru umumnya dilakukan oleh organisasi bentukan negara.

*Of great importance one can draw from political economy studies on East Asian developmental states is the striking ability of the state to direct private sectors to embark on rapid industrialization and to make higher productivity. In such a setting, the state focused its resources on upgrading its capacities to dictate private-run industries through strong and solid organization of bureaucracy, while private businessmen were drawn to follow directions stated in state policies that sought to improve industrial performance and technological innovation.... As a result, the attempt to enhance national competitiveness through research and development lied mostly in programs and activities run and funded by private sectors. Hence, **industrial innovation occurred predominantly within the domain of private industries and most of the funding of this nature was part of business investments....***

*On contrary, scientific research and technological development for industrial purposes in Indonesia during the New Order period were mostly carried out by state-related organizations*

(Amir, 2013, 78, bold ditambahkan).

Walaupun hal ini tidak unik untuk Indonesia, situasi tersebut menyebabkan kondisi “*the growth of private enterprises in manufacturing sectors did not make it necessary for corporations to deepen their capacity in research and development (R&D)*” (pertumbuhan perusahaan-perusahaan swasta di bidang manufaktur tidak berarti bahwa korporasi-korporasi tersebut memperdalam kemampuan mereka untuk riset dan pengembangan atau R&D)” (Amir, 2013, 79),

*[D]ue to the import-substitution policies that the New Order implemented during the 1970s and 1980s—following the global trend of development at the period... [m]ost large-scale industries, such as automobiles and electronics, made profits primarily from imported technologies from their principals in Japan, South Korea, Germany, and the United States. Imports of technology included tool machineries and product innovation where only a tiny part of these had been localized. Despite the fact that these industries partly belonged to Indonesian businessmen, new product development and technological innovations in private industries were largely dictated by the headquarters of the principals; the local businessmen often at times acted as a passive partner in research and technological innovation. A few of these industries did have R&D divisions within the company, but product development activities were limited to an infinitesimal portion in design and engineering that produced insubstantial innovations and scientific outputs.*

(Amir, 2013, 79).

Secara lebih spesifik bisa dikatakan bahwa permasalahannya adalah

*“On one side, private sector companies were generally reluctant to spend money on R&D due to a high risk of failure. They would rather purchase imported technologies, which had been proven successful in the market. On the other hand, foreign principals had no genuine intention to transfer their technology to their local partners and provide them with the capacity to develop their own technology...[therefore] when it comes to technology development, unlike the case of Japan with its keiretsus and South Korea with its chaebols, state interventions did not materialize into the strengthening of technological capacities of private industries that would by and large enhance national competitiveness. (Di satu sisi, sektor swasta umumnya enggan menghabiskan uang untuk R&D karena tingginya risiko kegagalan. Mereka lebih suka membeli teknologi impor yang sudah terbukti sukses di pasar. Di sisi lain, pihak asing tidak mempunyai keinginan untuk mentransfer teknologi mereka kepada partner lokal untuk memberikan kemampuan mengembangkan teknologi mereka sendiri... [oleh karena itu] ketika berbicara tentang pengembangan teknologi, berbeda dengan kasus Jepang dengan keiretsus-nya dan Korea Selatan dengan chaebols-nya, intervensi negara tidak mewujudkan pada penguatan kapasitas teknologi industri swasta yang pada tahap selanjutnya akan memperkuat daya saing nasional)”*

(Amir, 2013,79).

Menurut Amir, sesungguhnya *“Suharto had not fully expected private conglomerates to turn into technological giants in their respective industrial fields* (Suharto tidak sepenuhnya mengharapkan konglomerat swasta untuk menjadi raksasa teknologi di bidang industri masing-masing)” karena *“[h]e was prone to believe that technology development ought to be the domain where the state played a pivotal*

*role due to the risks private players were not ready to take* (ia cenderung untuk percaya bahwa pengembangan teknologi harus berada di domain tempat negara memainkan peran utama karena risiko yang tidak siap diambil oleh pemain swasta)” (Amir, 2013, 79). Keadaan ini menurut Amir adalah karena “*private-owned major industries were deeply embedded in **the rent-seeking structure** of the New Order political economy*” dan karena

“***merchants mentality**, for the big businesses aimed only to grab short-term profits from selling imported products rather than create their own*”

(Amir, 2013, 79, bold ditambahkan).

Analisis Amir di atas karena sifatnya “*political economy*” agaknya dapat diperbandingkan dengan analisis Richard Robison (1987) dalam *Indonesia: The Rise of Capital*—buku yang dua kali disebut Amir dalam *The Technological State in Indonesia*. Perbandingan ini diperlukan untuk melihat cara Indonesia mengembangkan sains dan teknologi melalui industrialisasi yang pada hakikatnya hanya merupakan “kepanjangan” dari kapitalisme global. Selain itu, penting untuk melihat lebih jauh istilah-istilah “*science, technology, and society (STS)*” dan “*science and technology studies*”; atau ringkasnya “*ST society*” dan “*ST studies*”, mengingat kedua istilah tersebut agak berbeda (Rip, 1999, 73–80).

## A. Industrialisasi Orde Baru

Sebagaimana dikutip oleh Amir, Robison menggunakan analisis kelas “*domestic capitalists and global capital powers*,” atau dalam istilah-istilah lain, “*foreign and local capitalists*,” serta “*farmers[...]and other lower-class group*.”

“... ***the New Order’s rapid industrialization gave rise to the capital class**, which Richard Robison (1987) observed during the height of the New Order. Using a Neo-Marxist framework,*

*Robison highlights the role of the New Order state in structuring the political economy to **bridge domestic capitalists and global capital powers***”

(Amir, 2013,13, bold ditambahkan)

*“From the structuralist view, a number of Marxist-inclined scholars took a political economy perspective to squeeze out the essence of the New Order authoritarianism situated in the context of the expansion of world capitalism. For instance, **Richard Robison (1987) and Jeffrey Winters (1996) pointed to structural mechanisms institutionalized by the New Order state to foster capital accumulation.** Critical in their examinations, these scholars highlighted the consequences of the New Order political economy for, farmers, and other lower-class groups who suffered the most from state policies while the interests of foreign and local capitalists were unrelentingly accommodated ....”*

(Amir, 2013, 20, bold ditambahkan).

Hal lain yang disampaikan Robison dalam *Indonesia: The Rise of Capital* bersifat prediktif,

*“... South Korea and Singapore suggest themselves as much more likely models of a future capitalist state in Indonesia than does Europe or North America” (Robison, 1987, 369).*

Sebagaimana ditunjukkan Amir berikut bahwa dengan terjadinya “*the Asian financial and monetary crises*,” Indonesia kenyataannya tidak bertransformasi menjadi “semacam” Korea Selatan atau Singapura. Namun, tidak diketahui apakah Robison telah memberikan sebuah analisis “neo-Marxist” mengenai ketidaktepatan prediksinya tersebut. Berikut catatan panjang Amir mengenai *post factum* Orde Baru.

*A contagious crisis*

*The sheer scale of the Asian financial and monetary crises was unpredictable. It began with a small problem that many observers initially thought to be an isolated event. In May 1997, the value of the Thai baht against US dollar dropped due to speculator assaults. This was perceived as an ordinary incident. The Thai government spent billions of dollars in preserving the value of its currency, a reaction that was supported by intervention from Singapore. Two months later, the situation worsened. The Thai baht was devalued but only resulted in a 20 percent decline in its initial value. As a result of the widespread panic, Thailand requested assistance from the IMF. A few weeks later, it became apparent that Thailand was not the only economy suffering from the currency emergency; every country in the region was affected by the contagious crisis. When the Korean won dramatically plunged, people began to realize that the ongoing crisis was much larger and deeper than previously assumed. As the crisis was already debilitating South Korea and Thailand, **Indonesia began to fear the spread of the crisis to its own shores. However, the New Order government adamantly insisted that such fears were unfounded.** Urging people to remain calm, Cabinet Secretary Moerdiono repeatedly announced that Indonesia's economic fundamentals were strong and resilient due to proper financial policies and robust institutions. He mentioned that there was no immediate indication of Indonesia's economy being plunged into financial turbulence...*

*As it turned out, this confidence was overly optimistic. In a matter of weeks, the financial contagion reached Indonesia. Indonesians were shocked when the exchange rate of the rupiah against the US dollar fell from 2,400 to 3,600 in July 1997. At this point, Indonesians started to feel the shock at home. **When the rupiah dropped by 30 percent against the US dollar in August 1997, it not only jolted the New Order government but established the conviction that the crisis was already***

***in effect throughout the country.*** As the value of the rupiah against the US dollar kept plunging, inflation soared, which in turn caused the prices of daily necessities to rise rapidly. The Suharto administration was in panic as the crisis emerged with such haste. In August 1997, the Indonesian government deliberately allowed the rupiah to float freely with hopes that the currency would regain its strength. The result, however, was the reverse; the rupiah fell further. One month later, knowing that the crisis was far greater than his administration could contain, Suharto decided to solicit financial assistance from the IMF. Responding to Indonesia's request, the IMF agreed to provide a loan package of US\$40 billion. But the loan package was not unconditional. On the recommendation of the IMF, in November 1997 the government closed down 16 private banks considered insolvent by the Bank of Indonesia. Rather than stabilizing the situation, this policy immediately lowered confidence about financial institutions, spawning anxiety among local and foreign investors. Record crowds filled several banks due to the fear of closure. The confidence in the rupiah went down even lower by the end of January 1998. The value of the rupiah against the US dollar reached 17,000, partly due to the IMF's reluctance to assist Indonesia in defending the rupiah. This marked the lowest point since the emergence of the crisis and many indications suggested that the rupiah was likely to plummet further, resulting in devastating effects upon Indonesia's economic and industrial sectors.

***When all Southeast Asian economies were deeply affected by the crisis, Indonesia fell into more severe problems. What was originally a financial crisis had now turned into a political crisis.*** The government's inability in preventing the economy from an economic free fall inevitably led to the erosion of Suharto's legitimacy. Pro-democracy activists seized this opportunity to dethrone the New Order authoritarianism once and for all. After struggling for years, these groups found



*a momentum in the crisis to tear down Suharto's power along with the institutionalized practices of korupsi, kolusi, and nepotisme (collusion, corruption, and nepotism), popularly referred to as KKN, that deeply plagued the regime. This was manifested through a student movement in Jakarta, which began with action by 20 students from the UI. They came to the parliament building to express their disapproval against the accountability speech Suharto delivered before MPR in March 1998. The message the students sent was clear; they wanted MPR to refuse Suharto another term of presidency. Contrary to the students' demand, Suharto was re-elected by MPR. He proceeded to appoint Habibie as vice president, which seemed unusual given that the position was always occupied by military-affiliated figures... What appeared more controversial amidst the whole criticism on KKN was the composition of the Seventh Development Cabinet, which comprised Suharto's oldest daughter Siti Hardiyanti Rukmana as the Minister of Social Affairs and Muhammad Hasan, a businessman who was very close to the Suharto family, as the Minister of Trade and Industry. It was evident that Suharto was completely oblivious of the fact that the citizenry was increasingly becoming disillusioned by the way Suharto's regime coped with the crisis.*

*In April 1998, the economy was almost brought down to its knees. **Thirty years of the New Order's developmental achievements were swept away by the economic crisis, virtually returning Indonesia to square one. Indonesia's image as a new Asian Tiger vanished overnight**".*

*(Amir, 1013, 149–151, bold ditambahkan)*

Perlu diingat bahwa segera setelah Indonesia kehilangan “*image as a new Asian Tiger*,” Soeharto yang sebelumnya dikenal sebagai “Bapak Pembangunan (*Father of Development*)” pun mendapatkan gelar baru, “Bapak Pembangkrutan (*Father of Bankruptcy*)” Indonesia

(Anderson, 2008, 40). Meskipun begitu, Soeharto sendiri tampaknya, tidak begitu terpengaruh dengan “the Asian financial and monetary crises” karena seperti dikatakan Charlotte Denny berikut.

*Suharto, regarded as a bulwark against communism in Asia, stole as much as \$35bn from his impoverished country during his three decades in power, before being deposed in 1998 in a popular uprising that was triggered by the Asian economic crisis.”*

(Denny, 2004)

Terkait dengan kegagalan industrialisasi Orde Baru, penting untuk mengetahui apa yang dikemukakan dalam kajian mengenai “Soeharto and the Japanese Occupation” berikut.

*It is arguable that the tainted terminology of German fascism and Japanese militarism became doubly derivative when Soeharto picked up the phrase “New Order” and applied it to his political system in 1966”*

(Jenkins, 2009, 5)

*The phrase “new order” is of interest....[T]he two endlessly repeated slogans of the late colonial regime were **rust en orde (peace and order) and opbouw (development)**. “Characteristically... the Suharto regime simply Indonesianized these slogans in the Orde Baru (New Order) and **pembangunan (development)**”*

(Anderson, 1999, 14, bold ditambahkan)

*It might be argued that the terminology was derivative in other ways as well. In 1940–41 there had been much talk about a New Order (Neues Ordnung) in Europe, with plans for a Reichsmark currency bloc. What was afoot, the historian Michael Burleigh (2001: 424) has noted, “was an old-fashioned*

*economic imperialism, with an industrially developed core surrounded by a periphery producing food and raw material”.*

(Jenkins, 2021,140, footnote 14)

Secara ringkas, menurut Jenkins, kita bisa menganggap Orde Baru sebagai “*an old-fashioned economic imperialism, with an industrially developed core surrounded by a periphery producing food and raw material* (imperialisme ekonomi pola lama, dengan pusat pengembangan industri yang dikelilingi oleh daerah pinggiran yang menghasilkan makanan dan bahan mentah)” sebagaimana yang dikemukakan oleh Burleigh di atas.

## **B. Kabir atau Kapitalis Birokrat: Faktor Penyebab Kegagalan Sains dan Teknologi di Indonesia?**

*“no ‘modernization’ can really take place, because feudalism blocks each development”* (tidak ada modernisasi yang bisa berjalan, karena feodalisme menghalangi perkembangan) (lesmaterialistes.com, 2014).

Mengacu pada “*the rent-seeking structure of the New Order political economy*” yang disebutkan di bagian sebelumnya, Robison sendiri, terkait dengan analisis kelas-nya, menulis paparan berikut.

*“Military, and to a lesser extent, satraps controlling state corporations became popularly known as ‘bureaucratic capitalists’ and were an increasing object to debate and concern not only because their blatant role in appropriating the legal property of the state but because they are constituted a significant element of the new and conspicuo[u]sly rich, the OKB (Orang Kaya Baru)...*

*The impact of b[u]reaucratic capitalism upon the reconstitution of a bourgeoisie in Indonesia was considerable. Allocation of credit, import and export licen[s]es, contract and foreign*

*exchange allocations was often made according to the needs of the politico-b[u]reaucratic in faction of the allocations”*

(Robison, 1987, 95).

Kenyataan tersebut, menurut Robison, merupakan implikasi (hal yang terbawa serta dari) dua peristiwa:

*In 1957 and 1958 the Dutch trading and estate enterprises, the core of Dutch colonial capital, were expropriated together with Dutch shipping, banking and industrial enterprises. They were followed by expropriation of British, American and other Westerner capital in 1963-65.*

*... it is true that nationalisations were politically inspired retaliation for Dutch policies in West Irian and British involvement in the formation of Malaysia ....”*

(Robison, 1987, 79)

Terkait dengan istilah “OKB (orang kaya baru)” dan “b[u]reaucratic capitalists”, Robison menjelaskan sebagai berikut.

*“Within the military itself there were important elements opposed to the large-scale appropriation of state fund and authority. General Nasution implemented a programme to recover illegally expropriated funds of state corporation, known as ‘Operasi Budi.’ It had, by 1964, recovered Rp11 million....*

*The PKI [Partai Komunis Indonesia] active in identifying and condemning ‘b[u]reaucratic capitalists’ because it eroded and discredited state ownership of capital as well as constituting a source of finance for the party’s political opponent ...”*

(Robison, 1987, 101)

Penting dicatat bahwa “*b[u]reaucratic capitalist*” tidak terdapat dalam analisis kelas yang dibuat PKI hingga tahun 1959. Kelas tersebut, “kapitalis birokrat” atau “kabir” begitu dikatakan, perlahan masuk dalam kerangka analisis PKI seiring dengan nasionalisasi yang, sebagaimana telah disebutkan, berlangsung sejak 1957 hingga 1965.

Adalah Partai Komunis Tiongkok (PKT) yang pertama kali memperkenalkan konsep “*b[u]reaucratic capitalist*”. Kapitalis birokrat atau kabir diperkenalkan akhir tahun 1930-an. Dalam sebuah artikel tahun 1950 atau setahun setelah berdirinya Republik Rakyat Tiongkok (RRT), yaitu “*The National Bourgeoisie in the Chinese Revolution*”, diargumenkan bahwa kelas tersebut merupakan kelas dominan pada “*a semi-feudal and semi-colonial country*”, sebagaimana Tiongkok hingga 1949. Mengutip Mao Tse-tung, artikel ini mengatakan:

*The bourgeoisie is divided into two different groups. One is the big bourgeoisie which is compradore in nature, and the other is the national bourgeoisie.*

*The compradore big bourgeoisie directly serves the imperialistic foreign capitalists, who, in turn support and nurture this class.*

(Huai, 1950)

Dan mereka adalah

*.... The Four Big Families—Chiang, Soong, Kung, and Chen—during their twenty years in power have amassed enormous capital worth ten to twenty billion American dollars and have monopolised the economic life-lines of the entire country. This monopoly capital, merged with state power, becomes state-monopoly capitalism. Monopoly capitalism intimately merged with foreign imperialism and the domestic landlord class and old-type rich peasants, becomes compradore, feudal, state monopoly capitalism. This is the economic foundation of Chiang Kai-shek's reactionary regime.*

*The bureaucratic capitalists, as represented by the Four Big Families of Chiang, Soong, Kung, and Chen, never developed any industry of their own.*

Sebuah fenomena lain dalam “*a semi-feudal and semi-colonial country*”, menurut sebuah tulisan lain, adalah terdapat apa yang disebut “*the feudal remnants*”. Kapitalis birokrat atau kabir terkait dengan “*industry*”, sedangkan “*the feudal remnants*” dengan “*modernization*”; “*No modernization can really take place, because feudalism blocks each development*” (lesmaterialistes.com, 2014).

### C. Indonesia Masa Orde Baru sebagai “*the Technological State*”

Pembentukan negara Indonesia pada masa pemerintahan Orde Baru, menurut Amir, bukan “*the plan-rational state*” yang dikemukakan Chalmers Johnsons dalam kutipan berikut: “*Placing more emphasis on the state’s approach to institutionalizing high technology within state structure*”. Negara masa Orde Baru, menurut Amir, adalah “*the technological state*”. Oleh karena itu, dapat dikatakan, percakapan Amir mengenai sains dan teknologi pada masa Orde Baru lebih merupakan “*ST studies*” dan bukan “*ST society*”. Menempatkan diskusi mengenai “*technology and development in the Third World context*” pada dua teori negara, “*Neo-Marxist scholars*” dan “[t]he other school of thought follows insights from Max Weber who emphasized the possibility for the state to run on its own rationality and to fulfill its own interests”, Amir berpendapat sebagai berikut.

*“Weberian arguments found empirical grounds from studies on economic progress that accelerated in late industrializing countries of East Asia during the 1950s until the 1970s. The supremacy of state institutions was brought to fore as the major factor in explaining why economic development and industrial growth was exceptionally successful in Japan, South Korea, and Taiwan, but failed to take off in other economies. No work on East Asian development is more influential than Chalmers*

*Johnson's MITI and the Japanese Miracle (1982) in which Johnson first coined the term developmental state. Drawing on a distinction Weber made between a "market economy" and "plan rationality," Johnson emphasizes the developmental state as distinctive from either the plan ideological Soviet type of state or the market-regulating type, such as the United States. This state form, Johnson maintains, is primarily characterized by the proclivities to take on development functions and the setting of substantive social and economic goals. **The developmental state, as Johnson puts it, is "the plan-rational state" in which "the government will give greatest precedence to industrial policy, that is, to a concern with the structure of domestic industry and with promoting the structure that enhances the nation's international competitiveness ...."***

(Amir, 2013)

Sebagaimana dikatakan Amir, bukunya—*The Technological State*—di-frame dari "*the notion of technology translation*", bukan dari "*the notions of technology transfer*". Konsep yang terakhir ini berasal dari pidato Harry Truman pada upacara pelantikannya sebagai presiden tahun 1949 dan mendapatkan rumusan teoretisnya dari "*the five stages of growth theory*" yang dikemukakan oleh Walt Whitman Rostow. Rostow, lewat teorinya mengemukakan, "*Suggest that a traditionally economic society starts to grow once the insights of modern science begin to be translated into new production functions*" dan "*suggests that **the application of technology is the pre-conditioning factor indispensable in the early stages of development.***" (Amir, 2013, bold ditambahkan)

#### D. Penutup

Menelisik amanat pembangunan Presiden (Sukarno) tertanggal 28 Agustus 1959 berikut, pada dasarnya Sukarno pada dasarnya telah secara tegas mengatakan bahwa demokrasi liberal telah usang dan tidak memenuhi tuntutan zaman. Dia mengusulkan *perencanaan*

*pembangunan yang sesuai dengan keadaan serta pengalaman yang konkret di Indonesia, sebagaimana yang dilakukan RRT, India, dan Yugoslavia.*

*Dengan berpokok kepada kebutuhan dan kepribadian Bangsa Indonesia, maka tjontoh pembangunan di luar negeri jang sesuai atau sedjadjar dengan kebutuhan dan kepribadian nasional itu dapat dipertimbangkan untuk diteladani.*

Berlainan dengan beberapa negara di benua Asia maka Republik Rakjat Tiongkok [RRT], mendasarkan pembangunannya kepada kolektivisme dan pengalaman-pengalaman pembangunan di luar negeri jang disesuaikan dengan keadaan serta pengalaman jang konkret di Tiongkok sendiri. Pembangunan RRT, India dan Yugoslavia ini ternyata telah berhasil dengan memuaskan dengan rentjana-rentjana lima tahunnja. Hal itu ternyata dalarn masa proses pembangunan selama 8 tahun belakangan ini. Dan suatu kenjataan jang tidak dipungkiri ialah bahwa pembangunan di RRT tersebut adalah **pembangunan dengan rentjana keseluruhannya dibawah pimpinan kebidjaksanaan daripada Demokrasi Baru atau Demokrasi Rakjat**, jaitu suatu bentuk ketatanegaraan jang sesuai kepribadian bangsa Tionghoa, seperti Demokrasi Terpimpin di tanah Indonesia jang akan kita laksanakan dewasa ini untuk menggantikan Demokrasi [L]iberal jang telah usang dan tidak memenuhi tuntutan zaman

(Liu, 1997)<sup>2</sup>.

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- 2 Terkait gagasan ini, perlu dicatat bahwa sebuah perjalanan panjang ke luar negeri dilakukan Presiden Sukarno pada tahun 1956 yang sedikit banyak telah memengaruhi pemikirannya di akhir periode pemerintahannya, “*Sukarno’s 1956 overseas trips were crucial in providing him with conceptual and practical examples of nation building, and would in turn play an important part in (re)formulating his own vision for the Indonesian state. These trips were also significant because they afforded him opportunities to observe and compare the world’s two major social systems. After his visit to the United States and Western Europe between May and June 1956, Sukarno travelled to Yugoslavia, Czechoslovakia, Russia, Mongolia, and*



Frasa masa proses pembangunan selama 8 tahun belakangan ini mungkin adalah yang belakangan menjadi dasar “Garis-Garis Besar ... Pembangunan Nasional Semesta Berencana Delapan Tahun 1961–1969,” sementara rentjana-rentjana lima tahun[an] merupakan gagasan yang berasal-usul pada—meminjam kata-kata Amir—“the plan ideological Soviet type of state”.

“Garis-[G]aris Besar Pola Pembangunan [ter]masuk Pola Proyek yang dimuat dalam Rancangan Dasar Undang-Undang Pembangunan Nasional Semesta Berencana Delapan Tahun 1961–1969 hasil karya Depernas yang termuat dalam Buku [K]esatu Jilid I, II dan III pada umumnya sesuai dengan Amanat Pembangunan Presiden tertanggal 28 Agustus 1959 [baik] yang diucapkan maupun yang tertulis ...”

(Ketetapan Majelis Permusyawaratan, 1960).

Sayangnya peristiwa tragis 1965 yang diikuti dengan digantikannya Presiden Sukarno oleh Presiden Soeharto pada dasarnya telah pula menghapuskan “proses pembelajaran” yang diperoleh Sukarno tentang tidak sesuainya penerapan demokrasi liberal yang membawa kapitalisme Barat bagi Indonesia. Pengembangan sains dan teknologi yang dilakukan Orde Baru jelas-jelas mengacu pada sejarah industrialisasi Barat yang pada hakikatnya tidak “terkejar” oleh Indonesia karena seperti dikatakan Rostow sebelumnya, “*the application of technology is the pre-conditioning factor indispensable in the early stages of development* (aplikasi teknologi adalah faktor prakondisi yang tidak bisa dihindarkan pada tahap awal pembangunan)”, yang untuk Indonesia baru dimulai ketika Habibie ditunjuk sebagai Menristek.

Tidak ada perubahan struktural ataupun kebijakan yang berarti pada masa pemerintahan Presiden Habibie, Gus Dur, Megawati, dan periode pertama pemerintahan SBY (1998–2009) terkait dengan bidang sains dan teknologi karena pemerintahan pada masa itu masih fokus pada restrukturisasi ekonomi terkait dampak krisis moneter

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*the PRC*” (Liu, 1997).

1997–1998 (Supriyatna, 2017). Baru pada periode pemerintahan kedua Presiden SBY (2009–2014) diupayakan pengembangan teknologi melalui pembentukan Sistem Inovasi Nasional untuk peningkatan kesejahteraan masyarakat dan pertumbuhan ekonomi nasional. Menurut SBY, “[Di] abad ke-21 yang akan menjadi *the most powerful driver of change* adalah teknologi”, dan “[u]ntuk mengembangkan *nano technology, bio-engineering, genomics, robotics*, dan lain-lain tentu tidak sepatutnya hanya didominasi dan dimonopoli negara-negara maju saja”. Oleh karena itu, “Dibutuhkan suatu Sistem Inovasi Nasional, yaitu suatu pengaturan kelembagaan yang secara sistemik dan berjangka-panjang dapat mendorong, mendukung, menyebarkan dan menerapkan inovasi-inovasi di berbagai sektor, dan dalam skala nasional” (Kompas.com, 2010).

Terkait pengembangan teknologi, dikatakan SBY ada tiga isu penting, yaitu pertama, “Tantangan yang dihadapi dunia dan Indonesia saat ini dan masa depan [, yakni] bidang pangan energi, air dan sumber lainnya”. Kedua, “Bagaimana kita memandang dan meletakkan hubungan yang tepat antara ekonomi dan teknologi”. Ketiga, “Membangun sinergi nasional, sinergi akademisi, bisnis dan pemerintah” (Putra, 2013). Visi SBY tersebut pada hari ini, kurang-lebih satu dekade setelah dicanangkan, pada praktiknya belum tercapai, terkecuali terbentuknya BRIN (Badan Riset dan Inovasi Nasional) pada tahun 2021 yang merupakan penggabungan dari LIPI, BATAN, LAPAN, BPPT, Kemenristek, dan para peneliti dari kementerian dan lembaga.

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