Technocratic Visions of Empire: Technology Bureaucrats and the "New Order for Science-Technology"

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Today Japan ranks as one of the world's technological superpowers. This achievement is remarkable in three respects: Japan was a late developer, it lacks natural resources, and it developed its technology without the scientific tradition of the West. Faced with such constraints, Japan chose to pursue a path of technological development that differed from that of the advanced Western countries. The nature of this distinctive model of technological development forms the subject of recent research on contemporary Japanese technology policy. One scholar has suggested the existence of a "technonational ideology," highlighting the role of strategy and ideology in Japanese technology policy.[1] Others have suggested the formation of a "regional production alliance" or "vertical *keiretsu* network" in Asia that will ensure Japan's technological hegemony in the region.[2] These studies point to long-term strategic thinking about technology among Japanese policymakers.

During the Second World War, a group of technology-minded bureaucrats devoted considerable effort to formulating a long-term strategy for technological development for Japan and its empire. These "technology bureaucrats" sought to devise a technology policy for Japan that would overcome the country's backwardness, lack of sufficient raw materials, and weak scientific base. They hoped to achieve this through the establishment of a "New Order for Science-Technology" (*Kagaku gijutsu shintaisei*) between 1940 and 1942.[3] As part of Konoe Fumimaro's "New Order," the New Order for Science-Technology represented one attempt by the government to mobilize the nation along totalitarian lines to prosecute

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[1] Richard J. Samuels, "*Rich Nation, Strong Army": National Security and the Technological Transformation of Japan* (Ithaca: Cornell University Press, 1994).

[2] Walter Hatch and Kozo Yamamura, *Asia in Japan's Embrace: Building a Regional Production Alliance* (Cambridge: Cambridge University Press, 1996).

[3] For a discussion of the New Order for Science-Technology see the following works: Tessa Morris-Suzuki, *The Technological Transformation of Japan* (Cambridge: Cambridge University Press, 1994); Sawai Minoru, "Policies for the Promotion of Science and Technology in Wartime Japan," *Keizaigaku Ronshū* 35, no. 1 (1995) and "Nitchū sensōki no kagaku gijutsu seisaku" *Nenpō Kindai Nihon*

the war in China. More than just a plan to mobilize science and technology for war, the New Order for Science-Technology formed a cornerstone in the bureaucratic vision of a postwar Japanese empire in East Asia. The technology bureaucrats looked beyond the military's immediate concerns of fighting a war and imagined an autarkic empire that would represent the outward projection of a united, industrialized, and technologically advanced Japan. A central objective of this movement was an attempt to devise a Japanese type of "science-technology" (*kagaku gijutsu*). Japanese planners believed that building a "new order" in Japan was the prerequisite for constructing a "new order" in East Asia – that placing Japan upon a scientific basis was the necessary first step to building a technologically based empire.

This essays seeks to illuminate wartime bureaucratic thinking about technology and technocratic control by examining the ideas underlying the movement for a New Order for Science-Technology. The focus here is on patterns of thought and implicit ideas about technology and its perceived role in Japan and East Asia. In this essay, I analyze the writings of two of the ideologues of the movement, Miyamoto Takenosuke and Mōri Hideoto. Miyamoto was an engineer in the Home Ministry and head of the Japan Engineering Association (Nihon Gijutsu Kyōkai).[4] Mōri was a renovationist bureaucrat from the Finance Ministry who helped design Manchuria's planned economy.[5] Both Miyamoto and Mōri believed that they represented a new breed of bureaucrats emerging after the First World War known as "technology bureaucrats" (*gijutsu kanryō*), equipped with both specialized technical knowledge and broad administrative experience.[6] Both joined the Asia Development Board (Kōain) in 1938 and the Cabinet Planning Board in 1941, where they designed a sci-

Kenkyū 13 (Tōkyō: Yamakawa Shuppansha, 1991): 44–65; Kawahara Hiroshi, *Shōwa seiji shisō kenkyū* (Tōkyō: Waseda Daigaku Shuppanbu, 1979); Hiroshige Tetsu, *Kagaku no shakai shi: Kindai nihon no kagaku taisei* (Tōkyō: Chūō Kōronsha, 1973); Nihon kagaku shi gakkai, *Nihon kagaku gijutsu shi taikei*, vol. 4 (Tōkyō: Daiichi Hōki Shuppan, 1966).

[4] For a study on Miyamoto Takenosuke, see Ōyodo Shōichi, *Miyamoto Takenosuke to kagaku gijutsu gyōsei* (Tōkyō: Tokai Daigaku Shuppankai, 1989) and Furukawa Takahisa, *Shōwa senchūki no sōgō Kokusaku kikan* (Tōkyō: Yoshikawa Kōbunkan, 1992).

[5] For studies on Mōri Hideoto, see Itō Takashi, "Mōri Hideoto ron oboegaki" in his *Shōwaki no seiji* (zoku) (Tōkyō: Yamakawa Shuppankai, 1993).

[6] For a recent study on the technology bureaucrats, see Ōyodo Shōichi, *Gijutsu kanryō no seiji sankaku: Nihon no kagaku gijutsu gyōsei no maku hiraki* (Tōkyō: Chūkō Shinsha, 1997). In contrast to Ōyodo, I adopt a broader definition of technology bureaucrats, which includes not only bureaucrats with an engineering background but also bureaucrats who closely identified themselves with the latest technological trends.

ence and technology policy for Japan and its empire. They promoted their ideas by means of an ideological campaign launched in engineering and right-wing journals, through speeches and interviews, and finally in the drafting of the New Order for Science-Technology.

State Efforts to Mobilize Science and Technology

In many respects, wartime policies to mobilize science and technology during the war represented no more than an intensification of existing policies that sought to raise the technological standard of Japan.[7] One can point to an impressive history going back to the Meiji period of government attempts to import and adapt advanced Western technology and promote private and public technical research through financial grants and the establishment of public research institutes, technical colleges, and universities. The semi-governmental Institute for Physical and Chemical Research (Rikagaku Kenkyūjo, or Riken), founded in 1917, perhaps best represents the state's early commitment to enhance Japan's industrial and military capability through science and technology.

State efforts to mobilize science and technology for war can be traced back to the First World War. For the military, the First World War indicated that future wars would be "total wars" (*sōryokusen*), requiring the mobilization of not only the country's military forces, but all aspects of civilian life—including science and technology.[8] At the center of total war mobilization was the attempt to make Japan self-sufficient in resources. This would require the development of heavy industry and the promotion of scientific and technical research to create not only sophisticated weapons for war, but synthetic substitutes for resources that the country lacked. The military's promotion of science and technology for total war included the establishment of research centers during the First World War, the navy's efforts to develop synthetic petroleum from 1919, and the establishment of the Resource Bureau (Shigen Kyoku) in 1927, which marked the first of a series of technocratic organs composed of military officers and civilian bureaucrats.

After the outbreak of the China war in 1937, the state began to assume a more interventionist role in promoting science and technology for war. Especially after the Nomonhan Incident, which demonstrated the superiority of Soviet military technology, and Germany's invasion of Poland in 1939,

[7] Morris-Suzuki makes this point in *The Technological Transformation of Japan*.
[8] For a discussion of total war mobilization, see Michael Barnhart, *Japan Prepares for Total War* (Cornell: Cornell University Press, 1987).

calls by the military for Japan to mobilize science and technology reached a peak.[9] In April of 1938, the Konoe cabinet established the Science Council (Kagaku Shingikai) for the purpose of resolving the nation's resource problems through science. Headed by Prime Minister Konoe and supervised by the Cabinet Planning Board, the Science Council brought together ministry officials, professors, and military officers to devise measures to promote scientific and technical research, especially in the area of machine tool production. A year later within the Cabinet Planning Board, the Science Division (later renamed the 7th Division) was created to promote science and technology for total war mobilization. Within the Ministry of Education, active promotion of science began after the assumption of the former army minister Araki Sadao to the post of Minister of Education in 1938. Through its Science Promotion Investigative Council (Kagaku Shinkō Chōsa Kai), the ministry aimed to increase funding for science research, promote technical education, and encourage the application of science in daily life.[10] Likewise, the Ministry of Commerce and Industry, which had been at the forefront of technological innovation since the early 1930s, created a series of laws to expand production in strategic areas, such as machine tools, automobiles, and aircraft to mobilize for war. Among these laws were the Artificial Petroleum Law and Steel Industry Law of 1937, and the Machine Tool Industry Law and Aircraft Manufacturing Law of 1938.

LAYING THE IDEOLOGICAL FOUNDATIONS FOR A TECHNOLOGY-BASED EMPIRE

The movement for the New Order for Science-Technology is commonly interpreted as simply one more attempt by the state to mobilize science and technology for war. However, this study suggests that the New Order for Science-Technology was qualitatively different. The movement gained momentum in December 1938, with the establishment of the Asia Development Board, a supraministerial agency created to oversee the government's policies in occupied China. The appointment of Mōri to the economic section and Miyamoto to the technology section marked the beginning of an alliance between the renovationist bureaucrats and engineers.[11] In contrast to the ministries and the cabinet, which viewed Japan's deficiencies in sci-

[9] In the so-called "Nomonhan Incident," Japanese troops suffered heavy losses when they clashed with Soviet forces along the Manchurian—Mongolian border between May and September of 1939. The incident was pivotal in alarming Japanese planners of the backwardness of Japan's military technology.

[10] Sawai, "Policies for the Promotion of Science and Technology in Wartime Japan," 49.

ence and technology mobilization as a problem of material and human resources, Miyamoto and Mōri believed that the problem went even deeper and lay in the minds of the Japanese. In their writings, both took pains to distinguish their efforts from those of the ministries and cabinet. Miyamoto warned: "It is a great mistake to view the promotion and mobilization of science as necessary for a state under a wartime system and only necessary to achieve the specific goal of handling the China Incident."[12] He described the establishment of the Science Deliberation Council and Science Mobilization Council in the cabinet as merely attempts to mobilize "weak Japanese science."[13] Mōri saw the problem as one in which technology continued to be understood as simply a human resource issue—an increased demand for skilled labor and engineers corresponding to the new demands of the wartime economy. Mōri explained: "The problem of technology in our country's wartime economy today—while it is becoming an important problem—still means no more than the unprecedented increase in importance of laborers and engineers within the economy."[14] As for the task that lay ahead, he suggested that "[t]echnology's transition from a materialistic existence within the economy to a life existence directly tied to the spiritual power of the race or nation is the essential problem of politics from now on."[15]

For the technology bureaucrats, the challenges of mobilizing science and technology were not only material but ideological and conceptual in nature. These bureaucrats keenly perceived that science and technology were crucial to transform Japan into an industrial and military power. Yet science and technology were viewed as foreign—as products of the West, developed within a Western liberal tradition, and based upon natural resources available to the West. Moreover, science was looked upon warily by the ruling class as subversive of Japan's emperor system. The historian Kawahara Hiroshi suggests that the tendency to "slight technology and view science as dangerous" (*gijutsu o keishi shi, kagaku o kikenshi suru*) formed one part of *tenno sei* ideology.[16] At a time of increasingly restricted access to Western technology, disillusionment with Western liberalism, and heightened calls to mobilize the nation under the imperial symbol,

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[11] For a description of the Asia Development Board see Imura Tetsuō, *Kōain kankō tosho zasshi mokuroku* (Tōkyō: Fuji Shuppansha, 1994).
[12] Miyamoto Takenosuke, "Kagaku kokusaku ron," in *Kagaku no dōin* (Tōkyō: Kaizōsha, 1941), 6.
[13] Ibid., 8–9.
[14] Mōri Hideoto, "Gijutsu no kaihō to seiji: gijutsu seishin no kakushin," *Kaibō Jidai* (September 1939): 4.
[15] Ibid., 5.
[16] Kawahara, *Shōwa seiji shisō kenkyū*, 200.

these bureaucrats recognized the need for Japan to develop a technology policy that was independent of the West and compatible with Japanese thought. They also perceived the need for a new type of bureaucrat to lead Japan, not mandarin bureaucrats trained in law, but "technology bureaucrats" equipped with technical expertise and a broad vision of empire.

Miyamoto Takenosuke

Miyamoto's appointment as head of the technology section in the newly created Asia Development Board represented the culmination of efforts by Miyamoto and members of the Japan Engineering Association to promote technology and raise the status of engineers within the government. Founded as the Japan Artisan Club (Nihon Kōjin Kurabu) in 1920, this association made "democracy and trade unionism" its guiding spirit and sought to mobilize engineers and enlighten society about technology.[17] The organization proposed such measures as the promotion of technological research, advancement of technical education, job search assistance, and the dissolution of academic cliques in the engineering field. From the beginning it adopted a critical stance toward capitalism, taking pains to separate technology from capitalism: engineers were "creators" (sōzōsha), while technology was described as a "cultural creation that fused together natural science and technique."[18] In 1935 the Japan Artisan Club changed its name to the Japan Technology Association and adopted the slogan of "guiding public opinion based on technology" and "technological patriotism."[19] The title of their journal would also change from *Kōjin* (Artisan) to *Gijutsu Nihon* (Technology Japan), and later to *Gijutsu Hyōron* (Technology Review).

From 1939, Miyamoto began to design the blueprint for Japan's technology-based empire. In a speech he gave shortly after joining the Asia Development Board, Miyamoto delineated the requirements for the construction of a new East Asia: a long period of time—between thirteen and thirty years, and a large amount of funds, raw materials, and human resources.[20] Such conditions were possible only in times of peace. Quoting an American scholar, Miyamoto indirectly called for an immediate end to

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[17] Miyamoto Takenosuke, "Gijutsuka no shakaiteki danketsu," *Gijutsu Hyōron* (June 1937): 2.

[18] Kaneko Gen'ichirō, "Miyamoto kun o omou," *Gijutsu Hyōron* (February 1942) quoted in Kawahara, *Shōwa seiji shisō kenkyū*, 65.

[19] Miyamoto Takenosuke, "Gijutsuka danketsu no shidō genri," *Gijutsu Hyōron* (July 1937): 1.

[20] Miyamoto Takenosuke, "Kōa gijutsu no konpon genri," from Gijutsu taikai kōen (1 March 1939), reprinted in Miyamoto Takenosuke, *Tairiku no keizai kensetsu* (Tōkyō: Iwanami Shoten, 1941), 145.

hostilities with China: "Perpetual peace must be established between China and Japan in order to develop China. Japan and China are of the same race and script, and theoretically it is natural that they should cooperate for their mutual benefit."[21]

In a key essay that he wrote the following year entitled "Kōa gijutsu no mittsu no seikaku" (The three characteristics of Asian development technology), Miyamoto developed the concept of "Asia development technology" (*kōa gijutsu*).[22] The unique features of Asia development technology would be its "rapid advance" (*yakushinsei*), comprehensiveness (*sōgōsei*), and "regional potential"—or ability to tap the sources of its surroundings (*ritchisei*). "Rapid advance" was defined in relative terms, as he explained: "for the purpose of the perpetual maintenance of the cooperative economy between the two countries and the fruits of joint prosperity, it is absolutely crucial that Japanese technology always maintains its superiority over Chinese technology."[23] Miyamoto suggested: "If Chinese technology advances by one, then Japanese technology must advance by two. Even if from now on the half-century handicap between the technology of both countries becomes increasingly pulled apart, rather than reducing it, limitless advance must be continued. For this reason Japanese technology must be more advanced."[24] To ensure that Japanese technology stayed ahead, its comprehensiveness and "regional potential" were essential. By comprehensive character Miyamoto referred to a unified and coordinated technology policy; by "regional potential" he meant that "Japan must have its own original technology which has been developed to suit the conditions—natural, social, economic conditions—of Japan."[25]

"Asia development technology" would be developed within a so-called East Asian Economic Community (*Tōa keizai kyōdōtai*) (*kyōdōtai* being a translation of the German word gemeinschaft). Miyamoto contrasted the notion of "community" to the idea of an "economic bloc." He defined "economic bloc" as "simply a joint phenomenon of both parties, a union through a bloc economy such as that formed between the colony and mainland, and held together by means of an economy of mercantilist exploitation."[26] In contrast, he suggested that the term economic community "makes as a condition reciprocity and equality, and common existence

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[21] Ibid., 139.
[22] Miyamoto Takenosuke, "Kōa gijutsu no mitsu no seikaku," *Tenshin Kyoku Zasshi* (March 1940), reprinted in *Tairiku no keizai kensetsu*, 177–183.
[23] Ibid., 179.
[24] Ibid.
[25] Ibid., 181.
[26] Miyamoto Takenosuke, "Tōa keizai kyōdōtai ron," *Gijutsu Hyōron* (December 1940), reprinted in *Tairiku no keizai kensetsu*, 58.

and common prosperity. It does not allow an exploitative economy of capitalistic selfishness within it."[27] Essentially, Miyamoto's conception of an East Asian Economic Community was based on the implicit ideas of hierarchy and mutual dependence. Mutual dependence in a superior-inferior relationship was to form the basis for Japan's relationship to China. Hence, it was necessary that Japanese technology maintains its "rapid advance" and maximizes its effectiveness through "comprehensive" development and through its regional character. "If Manchurian and Chinese—especially Chinese—technology rapidly develops in the future without the aid of Japan and that country's rich resources can be developed, then mutual sharing of technology between Japan and China will cease to exist, and will bring about none other than the internal collapse of the East Asian Economic Community."[28] In other words, Asia development technology would enable Japan to catch up with the West through the resources of the Greater East Asia Co-prosperity Sphere at a time when access to foreign technology and raw materials was becoming increasingly restricted. Moreover, it would represent Japan's "contribution" to East Asia, and thereby provide the justification for Japanese hegemony in the region.

Mōri Hideoto

Among the renovationist bureaucrats, Mōri had the most developed and philosophically grounded vision of empire that he developed in monthly essays in the renovationist journal *Kaibō Jidai* (Era of Analysis) under the pen name Kamakura Ichirō. Together with the renovationist bureaucrats Minobe Yōji and Sakomizu Hisatsune, Mōri was known as one of the "three ravens" (*sanba karasu*) of the Cabinet Planning Board and the ideologue of the group. According to Minobe, Mōri would provide the ideas, Sakomizu would systematize them, and Minobe would be responsible for their implementation.[29] As a member of the Asia Development Board and Cabinet Planning Board during the key years between 1939 and 1941, Mōri participated in drafting policies for the New Order for Science-Technology. Particularly through his essays in *Kaibō Jidai* and contributions to technology journals, such as *Gijutsu Hyōron* and *Kagakushugi Kōgyō*, Mōri undertook the task of making science and technology a part of Japanese culture. His attempts to take technology and science out of the abstract, universal, individual-based liberal capitalism and place it within a national community (*kokumin kyōdōtai*) based on the "volk" (*minzoku*) and "con-

[27] Ibid., 59.
[28] Ibid., 63.
[29] Minobe Yōji, *Yōyō kano – Minobe Yōji tsuitōroku* (Tōkyō: Nihon Hyōronsha, 1954), 129.

crete" national activity were remarkably similar to efforts by so-called reactionary modernist engineers and intellectuals in Weimar and Nazi Germany.[30]

In an essay which he wrote shortly after joining the Asia Development Board entitled "Tōa kyōdōtai to gijutsu no kakumei" (The East Asian Community and the revolution of technology), Mōri attempted to develop a new theoretical basis for technological development within a Japan-Manchuria-China sphere.[31] Within this regional sphere, technology would be developed upon the new economic basis of the "national economy"(*kokumin keizai*) instead of upon the basis of Western liberalism. Mōri contrasted this national economy with the liberal economy. The liberal economy was founded upon the principle of the individual and the "universal principles of mankind," while "liberal economics" explained economic phenomena in terms of the "surface relationship" between the national and world economy. In the pursuit of commercial profit, the national economy had previously "expanded its area of participation in the world economy through the mechanism of free trade."[32] The liberal system subordinated a nation's economic activity to the world economy, where the value of a country's natural resources and the extent of their development were dictated by the world market. However, as he explained, "the significance of today's economic activity is national economic activity, not for an abstract individual or mankind; it is activity as concrete national activity."[33] The national economy would be independent of the world economy, and economic activity, especially the development of natural resources, would be based upon the needs of the national economy rather than upon some abstract notion of free trade.

Like Miyamoto, Mōri believed that the key to a self-sufficient national economy was the development of synthetic raw materials, which he believed represented a "new industrial revolution." As Mōri explained in "Gijutsu no kaihō to seiji: gijutsu seishin no kakushin" (Government and the liberation of technology: the reform of the spirit of technology): "When raw material resources do not directly exist within the state's territory, the state maintains relationships abroad. In this way, both domes-

[30] See Jeffrey Herf, *Reactionary Modernism* (Cambridge, Mass.: Cambridge University Press, 1984). It is not clear to what degree German engineers and intellectuals influenced Japanese technology bureaucrats. However, one active participant in the debates on the New Order for Science-Technology, Aikawa Haruki, was familiar with of their writings. See Aikawa Haruki, *Sangyō gijutsu* (Tōkyō: Hakuyōsha, 1942).

[31] Mōri Hideoto, "Tōa kyōdōtai to gijutsu no kakumei" *Kaibō Jidai* (March 1939): 4–12.

[32] Ibid., 5–6.

[33] Ibid., 5.

tically and internationally, a country's government is dependent upon and subjected to an economy that is built upon the control of natural raw materials."[34] If technology could solve Japan's resource problem, then developing technology would no longer be a problem of mobilizing materials, but would become a problem of mobilizing the creative powers of the people—in other words, "a problem tied to the national community and to its spirit and people." The new technology "came to possess spiritual and cultural significance because its progress was the gauge to measure the freedom of creativity of the people." In terms of this creativity—"immense creativity is not of one human being but is rigidly and deeply tied to the people's communal life."[35] Mōri summed up the characteristics of the new technology as follows: technology is neither simply a means of production nor specialized individual technology resulting from random discoveries as in the West, but is a technology of the national community based upon synthetic raw materials and "supported by the lively creative character within the community." Moreover, "it is comprehensive, uniform, and possesses a greater planning character due to its being unified into something ethnic and its uniform character makes technology's actions spiritual."[36]

A prominent theme in the writings of Mōri and Miyamoto was the call for a new type of bureaucrat to administer such a technology-based society. A technology-based society meant not only a society based upon synthetic resources and heavy industry, but one built upon superior organization. According to Miyamoto: "The guiding principle of so-called renovationist national policy is … rationalization of every section of society, of the economy, and of government. The utmost efficiency of structure should take priority; the minimum use of labor to achieve maximum efficiency is the principle of the economy."[37] Mōri envisioned a functionalist society organized by occupation. In such a society, conflict between labor and capital will be eliminated, and "workers and entrepreneurs will acquire the status of organizers."[38] He suggested that, "[f]or the nation, possession of industrial raw materials and supplies necessary for life and all other things becomes not a problem of importing money and capital, but a problem of organization".[39] Mōri suggested that, as for the new type

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[34] Mōri Hideoto, "Gijutsu no kaihō to seiji: gijutsu seishin no kakushin," *Kaibō Jidai* (September 1939): 4–8, reprinted in *Gijutsu Hyōron* (September 1939): 12–15.
[35] Ibid., 7.
[36] Ibid., 8.
[37] Miyamoto Takenosuke, "Kakushinteki kokusaku juritsu no yōken," *Gijutsu Hyōron* (August 1937): 3.
[38] Mōri Hideoto, "Nihon kokumin keizai no keisei to seiji," *Kaibō Jidai* (April 1939): 30.

of bureaucrat, "naturally, they must change from legislative bureaucrats to so-called "creative bureaucrats" (*sōzōteki/kurie-chibu na kanryō*). This is a strange word; however, in the area of technology it is also the same. We were "conservative engineers" (*hoshuteki gijutsusha*) who drafted, applied, and interpreted laws; from now on we will be "creative engineers (*sōzōteki gijutsusha*)."[40]

While Mōri advocated the need for "creative engineers" in the bureaucracy, Miyamoto called for the need for "administrative engineers" in the technical field:

> The concept of integrated technology is the latest concept, even abroad. As in Germany, the term "administrative engineer (*Verwaltungsingenieur*) is being used. In contrast to the specialized engineer who is entrenched in his own field, [the administrative engineer] maintains contact with all fields including government, economics, and culture, and displays the synthesized results … I think that this is the new direction of technology and at the same time its true mission.[41]

Here, the vision of technocratic control put forth by Mōri and Miyamoto was that of a society run by technology bureaucrats who perceived the challenge of government as ultimately that of organization.

Designing the New Order for Science-Technology

The movement for the New Order for Science-Technology was officially launched on 12 April 1940 as part of Prime Minister Konoe's New Order movement. Upon the request of the chief of the political section of the Asia Development Board Suzuki Teiichi in May of 1940, Miyamoto began producing the first drafts for the Technology Board. These drafts were then presented to the Cabinet Planning Board director Hoshino Naoki. The models which the technology bureaucrats turned to were not the liberal models of the advanced Western countries, America and Britain, but the statist models of the late developers "Manchukuo," Soviet Russia, and Nazi Germany.

Organizing the New Order for Science-Technology

One organizational model for the future Technology Board could be found in the Continental Science Board (Tairiku Kagakuin) in Manchuria.[42] As

[39] Ibid., 30.
[40] "Zadankai: Kakushin kanryō," *Jitsugyō no Nihon* (1 January 1941).
[41] Miyamoto, "Kōa gijutsu no konpon genri," 152.

with many of Japan's wartime planning agencies and control laws, Manchuria served as an important experimental ground to try out new policies and methods for Japan and its empire. Plans for a central agency for scientific research were initiated by the renovationist bureaucrat Hoshino Naoki, under whose leadership at the Cabinet Planning Board the science-technology new order would be launched. A Finance Ministry official in the early 1930s, Hoshino rose to the prime ministership in Japanese-controlled Manchukuo and was known as one of the *ni-ki-san-suke*.[43] Upon the invitation of Hoshino in 1934, the founder of Riken, Ōkochi Masatoshi, established the research center with the assistance of engineers and scientists such as Fujisawa Takeo of the Cabinet Resources Bureau and Suzuki Umetarō of the research bureau of the South Manchurian Railways (Mantetsu).

As the central agency for scientific research in Manchuria, the Continental Science Board sought to develop the resources of Manchuria, train researchers, and promote scientific knowledge. All science and technology-related research was to be assumed by the agency, including the science research functions of Mantetsu. Hoshino justified the assumption of Mantetsu's scientific research center in Dairen by the need to geographically centralize research practices in the capital of Shinkyō (now Changchun). Politically, this move symbolized the takeover of science and technology planning by the renovationist bureaucrats after their arrival in Manchuria.

The original inspiration for the Continental Science Board was Germany's Kaiser Wilhelm Institute, which served as a model for a centralized, semi-governmental research institute.[44] The organization of its various research sections was modeled on Riken. However, Riken's growth into a sprawling conglomerate also served as a lesson in what to avoid. Suzuki Umetarō lamented: "there are over 680 research laboratories and institutes both private and public. These various institutes cover different jurisdictions resulting in sectionalism, inflexibility, and overlapping of research. From the standpoint of cost, it is extremely inefficient. We seek to avoid these problems in Manchuria and make it as close to the ideal as possible."[45] For this reason, the Soviet model became the principle organizational model for the Continental Science Board.

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[42] Kawahara, *Shōwa seiji shisō kenkyū*, 84–92.

[43] The *ni-ki-san-suke* referred to the last syllable of the leaders of the Manchukuo government: Tōjō Hideki and Hoshino Naoki, and Kishi Nobusuke, Ayukawa Giisuke, and Matsuoka Yōsuke.

[44] On the founding of the Continental Science Board see Hoshino Naoki, *Mihatenu yume* (Tōkyō: Diamondosha, 1963), esp. 170–75.

[45] Suzuki Umetarō, "Tairiku no hatten to kagaku" (1938), in *Nihon kagaku gijutsu shi taikei*, vol. 4, 324.

The attractive features of the Soviet model were that science research was centralized and placed under the state, and scientists participated directly in policy-making and enjoyed high status within the government. Suzuki described Soviet science policy in the following way:

> As you all know, after the Russian revolution, religion, and superstition were disaffirmed, and the basis for government became the stability of the people's lives – in other words, planning for the strengthening of national defense and providing for the necessities of life. Only through the power of science-technology can this be achieved. As a result, a large amount of energy is devoted to promoting science. More than ten large research organs were constructed in Moscow, prominent scholars and researchers gathered and organized an academy which was made into the central research agency for science-technology. [Furthermore,] its head participates in the highest levels of planning within the government. As for important national policies, the academy is consulted via this representative, and concrete plans are drafted based on research studies carried out in the various research institutes. These become the working plans for such things as the Five-Year Plan.[46]

Similar principles were applied in the design of the Continental Science Board. It was placed directly under the Prime Minister (*kokumin sōridaijin*), the head of the institute was given the rank of minister by being "specially appointed" (*tokunin kan*), and researchers became "research bureaucrats," a rank higher than that of clerk (*jimu bunkan*), and were provided a salary equivalent to that of a high-level civil servant (*tokkyū bunkan*). In terms of its research policy, the Continental Science Board would be a comprehensive research organ dealing with all aspects of the natural sciences. Its research agenda aimed to further national policy and was to be set by a Science Deliberation Committee composed of the Prime Minister, Chief of General Affairs (*sōmuchō kan*), bureau chiefs, and the director of the Continental Science Board.[47]

In the late 1930s and early 1940s, the founders of the Continental Science Board would apply their experiences in Manchuria at the Cabinet Planning Board in Japan. Under Konoe's second cabinet, Hoshino Naoki would direct the New Order as president of the Cabinet Planning Board and Fujisawa Takeo would become head of the Cabinet Planning Board's

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[46] Suzuki Umetarō, "Manmō shigen no kaihatsu to kagaku," *Gijutsu Hyōron* (October 1941): 33.

[47] Manshūkokushi Hensan Kankōkai, ed., *Manshūkokushi: Sōron* (Tōkyō: Manmō Dōhō Engokai, 1965), 1127.

Seventh Division. Suzuki Umetarō, as head of the Continental Science Board, would continue to preach the virtues of Soviet science policy, and the Cabinet Planning Board's resident Soviet specialist, Nakamura Masao, would regularly contribute articles to Miyamoto's *Technology Review* about Soviet technology policy. However, as the technology bureaucrats would discover, developing science and technology policy in Japan posed a much more formidable challenge. Unlike in Manchuria, where technology bureaucrats were given a free hand to create science and technology policies from scratch, planners in Japan had to confront a firmly entrenched political culture that looked warily upon science.

Mobilizing the Scientific Spirit of the Nation.

If the Soviet model of science mobilization provided an important organizational inspiration for the New Order for Science-Technology, it was the "scientific" and "spiritual power" of Nazi Germany that set the standard for the ideological mobilization of science and technology in wartime Japan. The head of the science division of the Cabinet Planning Board and admirer of German technology policy, Morikawa Kakuzō, even published a study entitled *Nachi seiji to waga kagaku gijutsu* (The Nazi Government and Our Science-Technology).[48] In this book, Morikawa set about analyzing the national character of Germans and the role of science and technology in German society in order to grasp the secret of Germany's technological success. He admired the national character of the Germans, which he described with the words *Sachlichkeit*, *Zweckmäßigkeit*, and *Rationalismus* (objectivity, practicality, and rationality). In comparing Japan and Germany, he suggested that in contrast to Germany, "Japan lacked the communal spirit, and has not undergone training in obedience, as evidenced by the recent spate of *gekokujō* (juniors overpowering seniors).[49] Moreover, "in contrast to the Japanese, the spirit of science permeates the everyday lives of Germans."[50] Morikawa was particularly impressed by the Deutsches Museum in Munich, which he believed demonstrated the high level of common awareness of science and technology in German society.[51]

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[48] Morikawa Kakuzō, *Nachi seiji to waga kagakugijutsu* (Tōkyō: Okakura Shobō, 1942).
[49] Ibid., 129.
[50] Ibid., 131.
[51] Morikawa Kakuzō, "Doitsu no gijutsu sha to Nihon no gijutsu sha" *Gijutsu Hyōron*, January 1941, contained in *Minobe Yōji bunsho* (Tōkyō: Tōkyō Daigaku Toshokan hen, 1988).

Miyamoto also looked to Germany as the model for technology mobilization in Japan. What attracted Miyamoto to Nazi Germany was its national spirit: "Nazi Germany says 'we will not grieve over our lack of resources. It is sufficient to overcome our intellectual poverty. Now we will either acquire or manufacture what we need.' The Japanese as well must overcome material difficulties through spirit and effort like the Germans."[52] Miyamoto was deeply influenced by the German "blitzkrieg," which he believed was made possible by two factors: "scientific power"—represented by superior weapons produced through science and machines—and "spiritual power." Miyamoto believed that the two were not conflicting, but were mutually dependent and represented a "harmonious fusion."[53] He believed that technology was the foundation for national defense, industry, and life, and that science made technology possible. The German blitzkrieg highlighted the important relationship between state and science, which he classified into three areas: national defense and science, industry and science, and daily life and science. In terms of the relationship between national defense and science, he suggested that "present and future wars are wars based on extremely advanced science and machines."[54] Industry and science had also become intimately related. Not only was "the application of science in the manufacturing production process indispensable," but science had become a substitute for raw materials. Through science, low-grade ore can be substituted for high-grade ore, while wood fiber can be used to make raw cotton, coal to make oil, and coal and lime to make rubber.[55] Finally, as for the relationship between daily life and science, he offered the following: "a country's national power is determined by the sum of material and human resources. If they are appropriately combined, the functional form it takes is national defense power and industrial power. Deficiencies in human resources can be supplemented by science."[56]

Miyamoto believed that the real obstacles in developing science and technology lay in Japanese and "oriental" culture, as he explained:

> In the ancient Orient, material things were looked down upon and spiritual things were revered. Our tradition was one in which materialism was rejected and idealism embraced. It is wrong to reject scientific civilization as materialist culture. Science is not material, and

[52] Miyamoto, "Kōa gijutsu no konpon genri," 147.
[53] Miyamoto Takenosuke, "Kokka to kagaku," *Risō* (December 1940); reprinted in *Kagaku no dōin*, 19.
[54] Ibid., 11.
[55] Ibid., 12.
[56] Ibid., 13.

> scientists are not materialists. Science is the study that makes clear ancient truths, and conforms to the law of mathematical principles, or the law of experience. "The 'clarification of the *kokutai*' (*kokutai meichō ron*) looks coldly upon science as if it were a heretic. It automatically assumes that it is absent from the Japanese character because it is a foreign culture. It is mistakenly linked with historical materialist thought, and looked down upon as a material thing, while [in contrast,] the Japanese value the spirit—hence it is viewed as combining charcoal and ice."[57]

Miyamoto tried to dispel two myths that he believed were associated with science in Japan: that science was associated with historical materialism, or Marxism, and hence incompatible with Japan's notion of *kokutai*; and that science's "materialist" orientation made it incompatible with the non-materialism, or "idealism" of oriental culture. By doing so, he hoped to make science more widely accepted among the people. As he suggested: "science is not only necessary for scientists, but crucial for nurturing the scientific way of thinking and perception among the general populace."[58] Only by incorporating science and the "scientific way of thinking" could Japan compete with the West.

Miyamoto's solution was to advocate a new type of Japanese "science-technology," in which he drew a distinction between "pure science" and "applied science" (i.e., technology) with an emphasis on the latter. Japanese science-technology recognized the intimate relationship between pure science and technology: technology was possible only through basic scientific research. However, science could possess a unique Japanese character only if it was directed toward the development of technology based upon the resources of Asia and furthered Japan's goals of military and industrial "catch-up." As he explained: "What I reject is pure science having a universal character. I affirm applied science having a regional, state, and racial character." Miyamoto believed that science and technology are rigorously tied together, and that the development of technology without scientific research is like "flowers blooming without grass" (*kusa nashi ga hana o hiraki*).

Mōri saw the need for a new ideology for Japanese science-technology "for the purpose of truly fusing science and technology into the life of the Japanese race"[59] Developing such an ideology involved several steps. In the same way in which Mōri had taken technology out of liberal capital-

[57] Miyamoto, "Kokka to kagaku," 22.
[58] Ibid., 8.
[59] Mōri Hideoto, "Seiji ishiki to kagaku gijutsu suijun," *Gijutsu Hyōron* (January 1941).

ism and placed it within the national community, he would now take science out of the "mechanistic materialistic worldview" and place it within his so-called "new worldview of quantum theory." In a dialogue with the Japanese philosopher Miki Kiyoshi in April of 1941, Mōri described the new stage of science.[60] According to Mōri, "Japanese science-technology remained no more than a struggle with the economy from the moment it awakened as modern science-technology."[61] Like technology, science research in Japan had been driven by economic development, and as a result, science-technology was subordinated to the economy and could only have a "materialistic existence." Like Miyamoto, Mōri believed that science had been associated with Marxism within Japanese ideology and was seen as the "source of the historical materialist world view."[62]

Mōri justified the mobilization of science by arguing that science was now moving toward a "higher stage" and was now compatible with Japanese culture:

> Modern science, which is pushing toward the completion of the study of atomic energy, is itself revising its view of the former historical, materialistic, mechanistic world picture and moving toward embracing oriental philosophy. Can't Japanese philosophy and today's new science become completely fused together? In other words, I sense that the development of science today is now able to be fused for the first time with our philosophy and science, and the reason why our ideology opposed science is because science was still in a primitive stage.[63]

The new stage of quantum theory, according to Mōri, represented "the fusion of mechanistic and metaphysical elements." This fusion heralded the fusion of the previous material, mechanistic science of the West, and the non-material, spiritual philosophy of the Orient. According to Mōri: "The reason why I am interested in science-technology is because, after all, the scientific view of the quantum theory and so-called 'metaphysical cognition' have become unified and [Japanese science-technology] no longer contradicts the Japanese totalitarian world view."[64]

Having created a new ideological basis for both technology and science, the last step for Mōri was to unite them into a Japanese type of "science-technology." He saw this as ultimately a problem of government. In an es-

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[60] Mōri Hideoto and Miki Kiyoshi, "Ashita no kagaku Nihon no sōzō," *Kagaku Gijutsu Kōgyō* (April 1941).
[61] Ibid., 187.
[62] Mōri, "Seiji ishiki to kagaku gijutsu suijun," 25.
[63] Ibid., 24.
[64] Mōri and Miki, "Ashita no kagaku Nihon no sōzō," 196.

say in the January 1941 issue of *Technology Review*, Mōri suggests: "There must exist greater sensitivity toward the mutually influencing character of science and technology in order to create a superior technology." A science-technology based upon a commercial economy "tends to sever science and technology, and a government founded upon a commercial economy, naturally from this standpoint, has a short-term perspective which is poor in the power of imagination about the future character of the ethnic people." Hence, for Mōri, "political consciousness must be created before technology and science are mechanically tied together." This was the duty of scientists and engineers to teach politicians and the people about the new stage of science and technology. "We must raise the people's political awareness of science in order to develop Japan's science-technology."[65]

IMPLEMENTING THE NEW ORDER FOR SCIENCE-TECHNOLOGY

The "Outline Plan for the Establishment of a New Order for Science-Technology" (Kagaku Gijutsu Shintaisei Kakuritsu Yōkō) was approved by the cabinet on April 1941. In the opening statement of policy, the government anticipated "the completion of a Japanese character of science-technology based upon the resources of the Greater East Asia Co-prosperity Sphere." This goal was to be achieved through "the establishment of a total war state system of science-technology," "the rapid development of technology," "the epoch-making advancement of science," and "the promotion of the scientific spirit of the nation."[66] The "Japanese character of science-technology" was based upon Miyamoto's "Asia development technology."

The Outline proposed policies that were grouped into three areas: policies to promote scientific research, policies to promote technology, and policies to "cultivate the scientific spirit." The centerpiece of the New Order for Science-Technology was the establishment of the Technology Board (Gijutsuin).[67] Like the Continental Science Board, the Technology Board was to serve as a comprehensive research agency for science and conduct research on basic science, applied science, and industrialization. As in the case of the Continental Science Board, the technology bureau-

[65] Ibid.
[66] Kikakuin Kenkyūkai, *Kokubō kokka no yōkō* (Tōkyō: Shinkigensha, 1941), 173.
[67] For a detailed study of the establishment of the Technology Board, see Sawai Minoru, "Kagaku gijutsu shintaisei kōsō no tenkai to gijutsuin no tanjō," *Ōsaka Daigaku Keizaigaku* (December 1991): 367–95.

crats sought to avoid the overlapping and redundancy of science and technology research in Japan. Through the supra-ministerial Technology Board, they hoped to bring together representatives of the various ministries to draft national policies and plans such as a Five-Year Plan for the rapid development of technology.[68] However, due to strong opposition by the various ministries, especially by the Ministry of Education and the Ministry of Commerce and Industry, who viewed such plans as infringing upon their area of authority, the drafters were forced to withdraw their plan and resort to trying to coordinate research among over 1,000 research institutes in Japan. In addition to the Technology Board, a Science-Technology Deliberation Council (Kagaku Gijutsu Shingikai) was to be established to unite the various science-technology inquiry boards such as the Ministry of Education's Science Promotion Investigative Council.[69] The establishment of both the Technology Board and the Science-Technology Deliberation Council was delayed until 1942. However, by this time, given the severe conditions of the Pacific War and demands of the military, science and technology mobilization was geared toward the short-term goal of fighting the war.

Conclusion

The New Order for Science-Technology represented an attempt by Japan's technology bureaucrats to develop a science and technology policy for Japan and its empire in East Asia. These bureaucrats sought to achieve this by developing a Japanese type of science-technology inspired by the models of scientific and technological development of Soviet Russia, Nazi Germany, and their own experimental ground of Manchuria. In launching the movement for the New Order for Science-Technology, renovationist bureaucrats and sympathetic engineers joined together to launch an ideological campaign to make science and technology compatible with Japanese culture. These bureaucrats also sought to convince the Japanese public that they as "technology bureaucrats" were uniquely qualified to run Japan's empire in East Asia.

Through the New Order for Science-Technology technology bureaucrats such as Miyamoto and Mōri articulated a vision of a postwar Japanese empire. They imagined this empire to be built upon the idea of a

[68] Ibid., 193.

[69] For a study on the Science-Technology Deliberation Council see Sawai Minoru, "Taiheiyō sensōki kagaku gijutsu seisaku no hitokusari" *Ōsaka Daigaku Keizaigaku* (October 1994): 1–23.

"community" characterized by mutual dependence, or a symbiotic relationship in which members would provide for the others' needs. For the "community" to be sustainable, each member would adhere to a defined role, with Japan assuming the position as technological leader in the region.

After the war the ideological foundations of this New Order were no longer tenable as Japan was now firmly entrenched in the democratic world order and its emperor system was disavowed. Within the postwar order, Japan has achieved tremendous economic growth and now ranks among the most technologically advanced countries in the world. However, with Japan's growing economic presence in Asia, concerns have been raised about whether Japan is building a "regional production alliance" or a peacetime "yen bloc" in Asia.[70] With the rapid economic development of Asia and Japan's increasing economic and technological influence in the region, has become all the more imperative to come to terms with Japan's recent past in Asia. The New Order for Science-Technology provides a window into wartime bureaucratic thinking about technology and technocratic control and in doing so, provides an important historical perspective to current discussions of Japanese technology policy and its role in Asia.

[70] See for instance, Hatch and Yamamura, *Asia in Japan's Embrace*, and Paul Maidment, "The Yen Bloc: A New Balance in Asia?" *Economist* (15 July 1989).