



HOKKAIDO UNIVERSITY

Title	Model Reference Adaptive Management Theory (II) : Focus on Taisho and the beginning of Showa Era of Japanese Management
Author(s)	Yamamura, Etsuo
Citation	Environmental science, Hokkaido University : journal of the Graduate School of Environmental Science, Hokkaido University, Sapporo, 14(2), 83-93
Issue Date	1992-03-30
Doc URL	https://hdl.handle.net/2115/37265
Type	departmental bulletin paper
File Information	14(2)_83-93.pdf



Environ. Sci., Hokkaido University	14 (2)	83~93	Dec. 1991
------------------------------------	--------	-------	-----------

Model Reference Adaptive Management Theory (II)

— Focus on Taisho and the beginning of Showa Era of Japanese Management —

Etsuo Yamamura

Department of Regional Planning, Division of Environmental Planning,
Graduate School of Environmental Science, Hokkaido University
Sapporo 060, Japan

Abstract

The main purpose of this paper is to clarify the adaptation policies on the introduction of management methods from the advanced countries in focus on Taisho and the beginning of the Showa Era of Japanese management.

The main adaptation policies are as follows:

- (1) The expansion of private capital investment of companies in existence and heavy industries.
- (2) The introduction of foreign capital for the modernization of industries.
- (3) The restoration of the right of tariff autonomy.
- (4) The expansion of foreign markets for exports and the new establishments and expansions of big companies.
- (5) The capital concentrated by financial cliques and the multiple management to gain a victory over Worldwide Panic.
- (6) The reformation of industrial technologies and progress of job efficiency.
- (7) The fixation of the career-long employment and the age-graded management.
- (8) The promotion to establish the school of industrial supplementary study and the training school of inner enterprises.

According to adapt to the violent quakes and repercussion such as Worldwide Panic and the invasion plans of European countries and America within the asian region, Japan intensified the alliances with the World Powers and conceived the same plan of invasion within the Asian region to restore the right of tariff autonomy. In 1933 (Showa 8), Japan had seceded from the League of Nation for the establishment of Manchurian by campaigns of the World Powers. Japan attacked China with a large-scale troops and entered the Pacific War. Japan introduced selectively the European management by the elevation of nationalism of the Japanese people.

Keywords : Model reference adaptive management, Japanese management, Reformation of industrial technology, Progress of job efficiency, Worldwide panic, Taisho and beginning of Showa era.

1. Introduction

After Sino-Japanese War, a large formation of companies prospered arising from the expansions of Korean and Chinese markets, the increases of investments of companies by the expansion of armaments, the promotion of export by the fall of silver price, the relief of monetary circulation by inflow of China's reward, and the introduction of foreign capital

(Bayley, 1976).

The main industries of formation were the Bank, Railway, Textile, Shipping, Coal mining, Oil, Insurance, Electricity and Gas (Yamamura, 1989b).

From the panic of 1900 (Meiji 33), the companies that had been disarranged were put in order and concentrated to big companies. The Russo-Japanese War arose and Japan obtained a great victory. Bigger formation of companies than the Sino-Japanese War were prosperous. The modern industries had developed gradually arising from the expansions of Manchurian and Saghalien markets, the introduction of foreign capital, the increase of private funds by nationalization of private railway companies, the restoration of right of tariff autonomy in 1911 (Meiji 44), and the formation of electric industries. The main industries of formation were the expansion of existing companies and heavy industries centered around Iron industry. But, the business condition had become stagnated from 1912 (Meiji 45) and continued to the Pacific War (Bennett, et al, 1976).

Japan advanced its plans to Manchurian and China by the World War I in 1914 (Taisho 3) and declared war on Germany arising because of the Anglo-Japanese Alliance. Japan had established the Chinese market by 21st Provisions of Demand to China.

The export and munition industries had grown by the new establishments and expansions of modern industries and also capitals had concentrated to big companies.

In 1918 (Taisho 7), the Prime Minister Kei Hara was chosen from the people. The period of Taisho Democracy continued arising from the alternation of political power between the Seiyuu party and Kensei party until 1932 (Showa 7). But, party politics had degenerated into corruptions and many scandals arose. The people's anger arose against the corruptions of party politics.

In 1920 (Taisho 9), the panic of banks culminated into ceasing of payment of 16 banks, and also the economy in Tokyo and Yokohama suffered big damages by the Great Earthquake of 1923 (Taisho 12). The government saved the banks from total collapse by the payment postponement order and the loans of reserve requirement funds. In 1927 (Showa 2), the panic of banks grew to the point when the stop of payment of 37 banks including Taiwan bank by the inflation policy of government of Bank of Japan occurred.

The World Panic in 1929 (Showa 4) showed its influence on the Japanese economy. Japanese economy had suffered big damages by a sudden of exchange and outflow of species. The foreign trade fell into a sudden decrease and many companies had gone into bankruptcy. The big banks had dominated the industrial capital by the concentration and forming of cartels. This panic continued until the Manchurian Incident and culminated in the stop of outflow of gold.

The Manchurian Incident started to occupy the rights and interests of Manchurian markets in 1931 (Showa 6) and the Manchurian country was established in 1932 (Showa 7). But, Japan had seceded from the League of Nation in 1933 (Showa 8) by the campaigns of World Powers. Japan started to attack to China by large-scale troops and entered the Pacific War. The bloc economy of World Powers was promoted and also the Anti-Japanese Movement in China intensified. At the end of the Pacific War, Japanese economy was destroyed by the interception of imports and air raids. The buildings, vessels and factories were completely destroyed by air raids and by the advent of the

atomic bombs, but the technology of manpower, the system of Japanese management continued after the Pacific War.

2. The Development of Management from Taisho Era to the First World War

Most companies were protected by Meiji government at the early days of Meiji era. This policy of protection had gone into order of weak. After the Sino-Japanese War, the financial cliques intensified not only in the economic power but also in the political power. The financial cliques adhered directly to the governors and bureaucrats such as Mitsui cliques with Kaoru Inoue, Mitsubishi clique with Masayoshi Matsukata and Takaaki Katou, Sumitomo clique with Kinmochi Saionji, Furukawa cliques with Kei Hara and Yasuda clique with Korekiyo Takahashi. The financial clique promoted the monopolistic formation by the protection policy of government, the custom policy, the nationalization policy of railways, the company union policy and the continental policy to Area. The financial cliques had changed the simple multiple management into the multiple management of concern type. The policies of fundamental management also changed the personal arbitrarily decision method into the consultation method because the rational decisions required by the scale of expansion and organization of big company and the multiple development of industries and markets (Yoshihara, 1982).

As for the employment system, the direct employment system was adopted in the light industries, and contracting employment system in the heavy industry, mining industry and marine product industry. In this sense, the previous wage systems such as the piece work payment, contracting employment, actual article payment, lending payment in advance, percentage system and bonus system, and also the low wage system was adopted.

From 1907 (Meiji 40), the contracting employment system was adopted in accordance to the changing to the direct employment system. And also the working hours was ordinary from 10 to 12 hours in the heavy industry. As for the worker's welfare for the work efficiency increase, the appendent hospital system, worker's cooperative society and the allocation system for inexpensive living goods were begun.

From 1897 (Meiji 30), the labor unions were organized and many strikes occurred. In 1899 (Meiji 32), the Police Law for Public Peace was enacted. The labor union was divested of rights of organization, the collective bargaining and the right of strike, and extinguished until the First World War.

As for the mechanical development, the power sources adopted the electric power to substitute for the steam engines. The mine pollution of Hitachi Mine effected the Area damaged by smoke with 4 towns and 24 villages and concluded the indemnification problem by the scattering method of smoke arising from the highest chimney of world with 155 m in 1912 (Taisho 1).

The bookkeeping by double entry was adopted, but the old bookkeeping still continued yet. Cost accounting was gradually adopted. and Namihei Kodaira (later, president of Hitachi Production Company) encouraged the spread of cost accounting as the foundation of management.

The marketing methods had changed widely from the end of Meiji to Taisho. The

deposit selling, overcharged selling and selling on credit had changed into the display selling, fixed prices and the selling on cash respectively. And also the customer visiting, order visiting and delivery of goods had developed.

The advertisement and propaganda using posters and newspapers, and the shop-fronts had remodeled to the shopwindows. And also, the public relations, magazines were published and exhibitions opened.

As for the financial affairs management, the rates of self capital supply represented the high values because the companies under the financial clique retained monopolic profits and more in overstock of capitals in the depression. The funds of companies were used for stock property more than the flow property. The average percentages of stock property of all industries were presented about 70% in 1914 (Taisho 3). The budget and cost control was not developed as yet. The profit rates of companies had changed from red ink to the black ink assets from the Russo-Japanese War and achieved stable economies.

3. The Development of Management from the First World War to the Pacific War

The management policies continued from the previous term such as the political advancement, concentration, Cartelization and multiplication a quantitative and qualitative elevation. The relationships between the financial cliques and political parties became close-fitting. For example, the financial cliques such as Mitsui, Yasuda, Sumitomo and Furukawa came to belong to the political party of Seiyukai, and Mitsubishi, Yamaguchi and Nezu to the political party of Minseitou. Each financial cliques sent their own representatives to the party. The party politics were controlled by the financial cliques and developed corruptions.

As for the concentration and Cartel, the big companies dominated many companies by merger. And also, the big companies became the large-scale and acquired monopolistic positions by the bankruptcies of many companies in the depression term from 1920 (Taisho 9) to 1931 (Showa 6). The number of big companies came to only 1%, but the total values of capital amounted to 65%. For example, 2062 banks in 1921 (Taisho 10) decreased suddenly 908 banks in 1932 (Showa 7) and the total deposits of five big banks concentrated to 40% of total deposits of all banks in 1932 (Showa 7). Two big milling companies supplied 80% of total supply. Six big mining companies had produced 70% of total outputs. Five big copper companies produced 95% of total output. And also, the government promoted intensification of Cartels by the compulsory joining of outsiders arising from the Important Industry Control Act enacted in 1931 (Showa 6). The big companies promoted to gain a victory over the Worldwide Panic and a monopolistic position by the close partnership with main banks (Alexander, 1979).

Until the First World War, the selling technique for raw materials and goods were promoted. After the First World War, the industrial rationalization movement was promoted by the Worldwide Panic. The temporary industrial rationalization board was established in the ministry of Commerce and Industry and promoted positively the administrative orders such as the increase of efficiency, establishment of fundamental industry, industrization of primitive industries, promotion of home product purchases, improvement

of industrial finance, rationalization of sales methods, establishment of industrial insurance and counterplan for world economy. This rationalization movement was promoted mainly on the industrial efficiency and introduced only a part of scientific management (Clark, 1979).

The companies established organization offices such as managing, engineering and commercial sections. Heavy industries promoted reformation of the temporary factory hands to formal factory hands by severe investigation and adopted the system of career-long employment and the age-graded management for the fixation of employment.

The exports of cotton cloths outran England by the mining cost reduction to buying of materials prospectively. The wool industries obtained a victory over big damages of limited export from England by the imports substituted from South Africa and South America. The iron steel industry had produced the melting-furnace irons to gain a victory over the difficulty of import of Indian ingots.

The companies promoted the establishment of the labor welfare facilities and published the internal house arising from the Factory Act, the Labor Protection Act and the warm heartedness and family principles.

Many labor unions were established by the prime labor concentrating to big companies, the living poverty based on inflation, the foreign impacts of the Russian Revolution and ILO, and the labor movement with universal suffrage after the First World War. The government suppressed on the intensification of labor movement by the extension of Law for maintenance of the public Peace in 1928 (Showa 3) and the policy of warm heartedness and family principles.

The development of mechanical technology and factory electrification developed by the electric power revolution was achieved.

The companies presented high profits and dividend rates in the term of First World War, but the profits decreased by Showa panic and many companies were merged by the mistakes of dividend policy.

The Manchurian Incident was started and the rights and interests of Manchurian markets were begin to be acquired in 1931 (Showa 6) and the Manchurian was established in 1932 (Showa 7). Japan seceded from the League of Nation in 1933 (Showa 8) by the pressure of World Powers. The prices of commodities and stocks had risen by the munition inflation. The funds of war expenditure and financial expansion was managed by the public loans. Japan had started to attack China by large-scale troops and entered to the Pacific War. The bloc economy of World Powers was promoted and the anti-Japanese movement in China intensified. The Japanese economy was destroyed by the interception of imports and air raids.

The buildings, vessels and factories were destroyed by intensive allied air raids and the atomic bomb, but the technology of manpower and the system of Japanese management had continued after the Pacific War.

4. Introduction of European Management

In 1898 (Meiji 31), Mitsubishi Shipbuilding Company constructed the ocean-going -vessels of 6,000 tons by the introduction of ship drafts and import of shipbuilding materials.

Tokyo Electric Company and Shibaura Production Company grew their production abilities by acting in concert the cooperation of General Electric Company U.S.A.

Tohru Noguchi who studied abroad to obtain patent of fertilizer production and established Japan Nitrogen Fertilizer Company in 1908 (Meiji 41).

The wide spinning machine made of iron by Sakichi Toyota (completion in 1908 (Meiji 41)) were adopted to substitute the foreign machines. Tomakomai factory of Oji paper company had adopted the new biggest paper making machine with 142 inches made in U. S.A.

Toushiro Ikeda first introduced the scientific management method such as F. W. Taylor, H. L. Gantt and F. B. Gilbreth in the serial form of Akita sakigake newspaper in 1911 (Meiji 44). The book of this serial was published in 1913 (Taisho 2) and became a best seller. When Yukinori Hoshino had visited to Europe and America in 1911 (Meiji 44), he bought Taylor's book "Principles of Scientific Management" and published Taylor's book in 1913 (Taisho 2). But, in these books, there were many difficult sentences that were hard to understand because metaphrase.

Yaichiro Ueno started lectures of Advertisement Psychology in University of Waseda from 1919 (Taisho 8) and published the book "Noritsu no Sinri" (Psychology and Efficiency). Ueno wished to apply the principles of efficiency actuary to factories. In the factory of Lion Tooth Powder Company, he studied the time and motion study and reformed the work progress to the conveyer system. Consequently, the outputs per worker increased 17%. And also, he reformed the work progress of the factory of Fukusuke Socks Company to the conveyer system. Consequently, the work time from cutting materials for sock making decreased from two or three weeks to only 2 days.

In 1919 (Taisho 8), the foundational juridical person Kyochokai was founded by shibusawa, and the financial world dispatched Ueno to study abroad to Europe and America for the establishment of Institute of Industrial Efficiency.

He acquired scientific management in Europe and America, and established the Institute of Industrial Efficiency in 1922 (Taisho 11). He had employed many experts and one excellent expert of them Toichiro Araki. The consulting works of Ueno based on scholastic and research work and he introduced scientific management to set forth the guidance of factories. His educational result were completed to establish University of Industrial Efficiency.

Toichiro Araki graduated Technical College of Tokyo (present Tokyo Institute of Technology) in 1916 (Taisho 5) and acquired Industrial Engineering and studied abroad as a researcher of the Ministry of Agriculture and Commerce. He participated at the Institute of Industrial Efficiency and established the Araki Office Efficiency independently. He debated guide the workers as the adviser to the president and obtained many good results.

For example, he had reformed the work progress of the factory of Chiyoda Shoe Company to use the conveyer system and established the coupon method which correctly reported each worker's job by manufacture number in 1924 (Taisho 13).

In 1925 (Taisho 14), he reformed the work progress of the factory of Nihonkoku Company to use the conveyer system to arrange the mismanagement of factory from great damages of the Great Earthquake in 1923 (Taisho 12) in order. The distance of movement of devices decreased one-ninth. As for the labor management, he reformed the second alternation system to 12 work hours to the third alternation system to 8 work hours and supported the wages of shortening hours by the group bonus method. This system gained good repute and Nihonkoku Company paid an allowance to Araki after finishing of contract in memory of his merits (Marsh, et al, 1976).

In 1924 (Taisho 13), he was request to reconstruct Nihonseifu Company from inactivity. He reformed many methods such as the shortening of progress of work, budget control and duty account by places of works, and the establishments of group bonus for the energy conservation. The consumption of coal was saved 30% by the bonus method, the rationalization of coal conveyer system and the inspection and repair of central heater was introduced.

In 1929 (Showa 4), he started to reform the efficiency of conveyer system and material control at the Yokohama Dock Company. He had executed first the delivery system by the addition of order sheets and actual goods. And also he intervened directly in the dispute and established the wage rationalization committee for making the rational grant system arising from the survey of labor living. He had established the wage principle which makes the impartial wage distribution than the steep ascent of wage levels.

He was imprisoned by Toujo the then Prime Minister from 1945 (Showa 20) to the end of Pacific War. In 1950 (Showa 25), he reorganized Araki Office of Efficiency to the corporate juridical person and established Institute of Efficiency of Japanese management and he became the director.

According to the expansion of enterprise scale and the high level of production management, the Japan Efficiency Association was established by the promotion of Ueno in 1927 (Showa 2). Ueno, Araki and Uno was elected as the managing directors.

The Tokyo factory of Niigata Iron and Steel Company introduced the first the scientific management by the promotion of factory director Shigeo Kato. Kato had studied abroad in Europe and America and aquired the scientific management in Tabor Manufacturing Company. According to the study of time and motion, the job time was saved 40% and the wage of labor showed a 30% increase. He abolished the contracting employment and made a good relationship between leader and labor. And also he established the third alternation system by the standardization of job system and wage system.

In the electric fan factory of Mitsubishi Electric Company, Ikuo Kato who studied abroad to Westing House Company in America applied a new method of time and motion study and formulas for wage incentives.

The scientific management was introduced to the national factories such as the military factory and national railway.

Takuo Godou of Kure Navy who studied abroad in America, introduced the scientific

efficiency such as the standardization of job system, machinery and progress of work.

Kouke Yamashita as a work director of National Railway appointed 100 researchers for time and motion studies to bring about the rational shortening of time. He adopted the formulas and charts of standard job time, and also published book "the handbook of time and motion study" in 1934 (Showa 9). The unit prices were decreased by one-third or half and the output doubled or tripled in each factory that carried out the time and motion study. The dissolution and repair of one locomotive required 28 days in 1914 (Taisho 3) to this was shortened 5 days in 1928 (Showa 3). This reformation was noticed in the world and some experts were dispatched to give advice to Soviet Union a second times.

In 1933 (Showa 8), Sadao Hatano of Navy was elected as the chief director of the Japan Efficiency Association and the military influence had become greater this association.

In 1942 (Showa 17), the Japan Industrial Association was absorbed by the Japan Efficiency Association. But, the Japan Management Association was established to spread the rationalization of management for private enterprises (Abegglen, 1973).

5. Educational System for Japanese Management

According to the increase of the rapid industrial development the problem of the shortage of skilled labor arose. Thus the ministry of Education promoted the establishment of the school of supplementary study of industry and the educational system of enterprises.

From 1910 (Meiji 43), the pupils of schools of industrial supplementary study showed an increase of 50,000 per year. According to the prosperity of these schools, the schools of industrial supplementary study were widely reformed by the Industrial School Act of 1920 (Taisho 9). The main content was the industrial education and the moral training education for the moral character.

Before, the subjects, the term of education was defined by region and the pupils that had finished elementary school could enter the school of industrial supplementary study.

The main reformations were as follows : (1) the compulsory elementary education, (2) the term of education was divided into two terms such as the former term for the fundamental technological education and the later term for the special technological education. This reformation resembled the change of Germany educational system from Fortbildungsschule to Berufsschule.

Before, the school of industrial supplementary study was established only by the local public bodies such as City, Town and Village. After, the prefecture also could establish schools based on the same treatment of teachers as the public junior high school. As a result, the numbers of schools and pupils with 8,900 schools and 490,000 pupils in 1915 (Taisho 4) increased to 15,000 schools and 1,050,000 pupils in 1925 (Taisho 14). But, 80% of the total schools were the agricultural school and only 103 schools were established for the industry and 450 schools for commerce.

The trained youth were organized to the youth training school based on the school based on the industrial supplementary study by the Youth Training Act in 1926 (Taisho 15).

The industrial rationalization movement in Europe and America was promoted for the

recovery of economy from Washington Disarmament Conference in 1921 (Taisho 10). This movement also was promoted in Japan. In 1924 (Taisho 13), the Empire Economic Conference was established by the Japanese government and the industrial rationalization of all industries was promoted.

In all factories, the schools of supplementary education and youth training for the education of enterprises was established. And also the enterprises reformed the management organization and established the engineering work branch for job control, material control, quality control, and time and motion study. From this reformation, the participation of management of employees were promoted according to the good communication of enterprises.

According to the shortage of skilled labors, Japanese government had promoted the industrial education compulsory enterprises by the youth training Act. Each enterprise had established the schools for industrial education, machinery education, and supplementary education. In 1940 (Showa 15), the numbers of schools of supplementary education and of factory established 107 schools and 1,000 schools respectively.

In 1935 (Showa 10), the both schools of industrial supplementary study and youth training were unified into the youth schools. These schools became compulsory and concentrated mainly on the military education in 1939 (Showa 14).

When Japan entered the Pacific War, the labor power was controlled by the National Mobilization Act. But, after the Pacific War, the American Style School System such as the junior and senior high schools was introduced according to the compulsory education of the youth school (Kobayashi, 1976).

6. Conclusion

The modern industries developed gradually arising from the restoration of right of tariff autonomy in 1911 (Meiji 44), the expansions of Manchurian and Saghalien markets, and the introduction of foreign capital and private funds altering public capital. The export and production increased by the new establishments and expansions of modern industries and also the capital was concentrated to the large companies of financial cliques. The financial cliques were intensified the economic power and the political power by the adherence to a political party.

The policies of fundamental management were changed to personal arbitrarily decision method into the consultation method because the rational decisions were based on the expansion of scale and organization of big company, and the multiple development of industries and markets. The companies established the organization offices such as management, engineering and commercial sections. Heavy industries promoted to reform temporary factory hands to the formal factory hands and adopted the system of career-long employment and the age-graded management for the fixation of employment. And also the companies established the labor welfare facilities and published the internal house organization arising from the Factory Act, the Labor Protection Act, and the warm heartedness and family principles.

According to increase of the rapid industrial development, the problem of the shortage

of skilled labor arose. The ministry of Education established the school of industrial supplementary study and educational system of enterprises. The numbers of schools and pupils with 8,900 schools and 490,000 pupils in 1915 (Taisho 4) increased to 15,000 schools and 1,050,000 pupils in 1925 (Taisho 14). Recently, the developing countries are experiencing difficulties on how to create business and industrial talents among their people. It is regarded that these conditions are created by the shortage of lower and middle, class workers.

The industrial rationalization movement in Europe and America was promoted for the recovery of economy from Washington Disarmament Conference in 1921 (Taisho 10). This movement was also promoted in Japan. The Japanese government promoted the industrial rationalization of all industries.

Especially, the management introduced concentrated on the direct benefits such as the conveyer system, the shortening of progress of work, the saving of materials, and the standardization of the job system.

Many scholars and leaders studied abroad in Europe and America to acquire the industrial management. After they returned home, they guided and educated the workers and presidents of factories and obtained many good results.

Recently, developing countries are experiencing difficulties of technological transfer. Japanese experience are good examples.

In 1933 (Showa 8), Japan seceded from the League of Nation for the establishment of the Manchuria by the campaigns of the World Powers. Japan started to attack China by large-scale troops and entered to the Pacific War. Japan introduced selectively the European management by the elevation of nationalism of Japanese people. Japan suffered defeat by national policies against Model Reference Adaptive Theory (Yamamura, 1983–1988, 1985) and the elevation of nationalism of Japanese people. To this effect, the Japanese experiences teaches some lessons as a means of confronting economic development problem currently that is being experienced in the developing countries (Yamamura, 1979, 1990).

Reference

- 1) Abegglen, James C. (1973) "Management and Worker." Tokyo, Kodansha.
- 2) Alexander K. Young (1979) "The Sogo Shosha-Japan's Multi-national Trading Companies." Charles E. Tuttle Company Tokyo.
- 3) Bayley, David. (1976) "Forces of Order : Police Behavior in Japan and the United States." Berkeley, University of California Press.
- 4) Bennett, John W., and Solomon B. Levine. (1976) "Industrialization and Social Deprivation." In Hugh Patrick, ed., Japanese Industrialization and its Social Consequences. Berkeley, University of California Press.
- 5) Clark, R. C. (1979) "The Japanese Company," New Haven, Yale University Press.
- 6) Marsh, Robert M., and Hiroshi Mannari. (1976) "Modernization and the Japanese Factory." Princeton, Princeton University Press.
- 7) Yamamura, Etsuo. et al. (1983–1988) : A Study on Model Reference Adaptive Control in Economic Development (1)–(8) : Environmental Science, Hokkaido University, Vol.6, No.2, 281–300, 1983, Vol.

- 7, No.1, 1–13, 1984, Vol.9, No.1, 27–43, 1986, Vol.9, No.2, 151–161, 1986, Vol.10, No.1, 19–35, 1987, Vol.10, No.2, 145–165, 1987, Vol.11, No.1, 47–79, 1988, Vol.11, No.2, 141–184.
- 8) Yamamura, Etsuo. (1985) : Optimal and Reference Adaptive Process for the Control of Regional Income Disparities : Paper of Regional Science Association, Vol.56, 201–213.
- 9) Yamamura, Etsuo. (1989a) : Model Reference Adaptive Theory on International Technology Transfer (I)–Transfer of Coal Mining Technology into Hokkaido– : Environmental Science, Hokkaido University, Vol.12, No.1, 17–26.
- 10) Yamamura, Etsuo. (1989b) : Model Reference Adaptive Management Theory (I)–Focus on Meiji Era of Japanese Management– : Environmental Science, Hokkaido University, Vol.12, No.2, 29–43.
- 11) Yamamura Etsuo. (1990) : Model Reference Adaptive Theory on International Technology Transfer (II)–Transfer of Triangulation Technology for a Vast Area of Hokkaido– : Environmental Science, Hokkaido University, Vol.13, No.1, 69–74.
- 12) Yoshihara, Kunio. (1982) “Sogo Shosha.” Tokyo : Oxford University Press.