



13-1-10

## EARTHQUAKE DISASTERS AND REHABILITATION

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### SUMMARY

This paper describes an earthquake disaster brought by the Japan's Kanto Earthquake of September 1, 1923, with magnitude of 7.9 on Richter scale, and its aftermath in socio-economic aspects. Its material loss was estimated as 5.5 billion yen on the basis of values in those days, corresponding to 41.5 and 7.14 percents of gross national products and of national wealth respectively. Decrement of income and income tax for the entire country was observed at 2.0 percents and 6.0 respectively. The worst decrement of income of 18.3 percents occurred in Kanagawa prefecture located on about a half of its fault zone and the similar decrement of 12.6 in Kanto district. Ratios of unemployment were estimated as twenty percents or more in Tokyo and Kanagawa. The central government had issued Imperial Orders to relieve refugees, to regulate city planning, and to rehabilitate the economy.

### INTRODUCTION

A material loss, convincingly estimated at 5.5 billion yen on the basis of values in those days, was caused by the Kanto Earthquake of September 1, 1923 with magnitude of 7.9 on Richter scale. There are several loss estimations between the lowest of 1.7 and the highest of 10 billion yen in literature. The conceivable loss reached 41.5 percents of gross national product of 13.25 billion yen in 1923, and 7.15 percents of national wealth of 77.0 billion yen.

The great loss in the Tokyo metropolitan area brought severe effects on socio-economic aspects for a long time. Professor Toshihiko Kato, University of Tokyo, indicated "The earthquake disaster had occurred in the period of economical depression, which was a reactions to booms in world economy brought by World War I, and accelerated the depression. The government had to make drastic measures in the aspects of finance, revenue, expenditure, and import and export balance."

### STATISTICS INFORMATION OF THE KANTO EARTHQUAKE OF 1923

A breakdown of losses of the Kanto Earthquake of 1923 is shown in table 1 covering seven prefectures including Tokyo, Kanagawa, Chiba and others in the severely damaged zone as shown in Fig.1. The loss of houses, buildings and household articles is estimated as 2.74 billion yen corresponding to 49.8 percents of the total loss; the loss of commodities and inventory as 2.14 billion yen, 38.8

Table 1. Material Losses in the Kanto Earthquake of 1923

(Unit:yen)

organization or District	House, Building and House Hold	Commodity and inventory	Ship, Electric and Factory	Imperial Family and Central Government	Public Works	Total
Imperial Family	-	-	-	12,253,000	-	12,253,000 ( 0.23%)
Central Government	-	-	-	219,559,956	-	219,559,956 ( 3.99%)
Great Tokyo	1,852,419,036	1,688,640,191	211,622,722	-	24,386,803	3,777,068,752 (68.59%)
Tokyo City	1,739,701,183	1,688,640,191	211,622,722	-	22,199,076	3,662,163,172 (66.50%)
Locals	112,717,853	-	-	-	2,187,727	114,905,580 ( 2.09%)
Kanagawa Pref.	802,637,995	447,249,547	67,277,347	-	67,682,078	1,384,846,967 (25.15%)
Yohohama City	377,041,385	447,249,547	47,965,570	-	31,281,375	903,537,877 (16.41%)
Locals	425,596,610	-	19,311,777	-	36,400,703	481,309,090 ( 8.74%)
Shizuoka Pref.	16,368,084	844,990	8,252,571	-	2,851,436	28,317,081 ( 0.51%)
Yamanashi Pref.	3,958,370	-	108,000	-	2,864,989	6,931,359 ( 0.13%)
Saitama Pref.	20,182,556	-	3,514,106	-	951,471	24,648,133 ( 0.45%)
Chiba Pref.	48,246,915	-	2,647,179	-	1,434,172	52,328,266 ( 0.95%)
Ibaragi Pref.	371,760	-	60,760	-	-	432,520 ( - )
Sum (Ratio)	2,744,184,716 (49.84%)	2,136,734,728 (38.80%)	293,482,685 (5.33%)	231,812,956 (4.21%)	100,170,949 (1.82%)	5,506,386,034 ( 100 %)

percents; the loss of production capital of factories, electrical power, ships, etc. as 0.29 billion yen, 5.3 percents; the loss of Imperial Family and Central Government as 0.23 billion yen, 4.2 percents; the loss of public works of rivers, harbors, dykes, roads, bridges, water supply, sewerage, etc. as 0.1 billion yen, 1.8 percents.

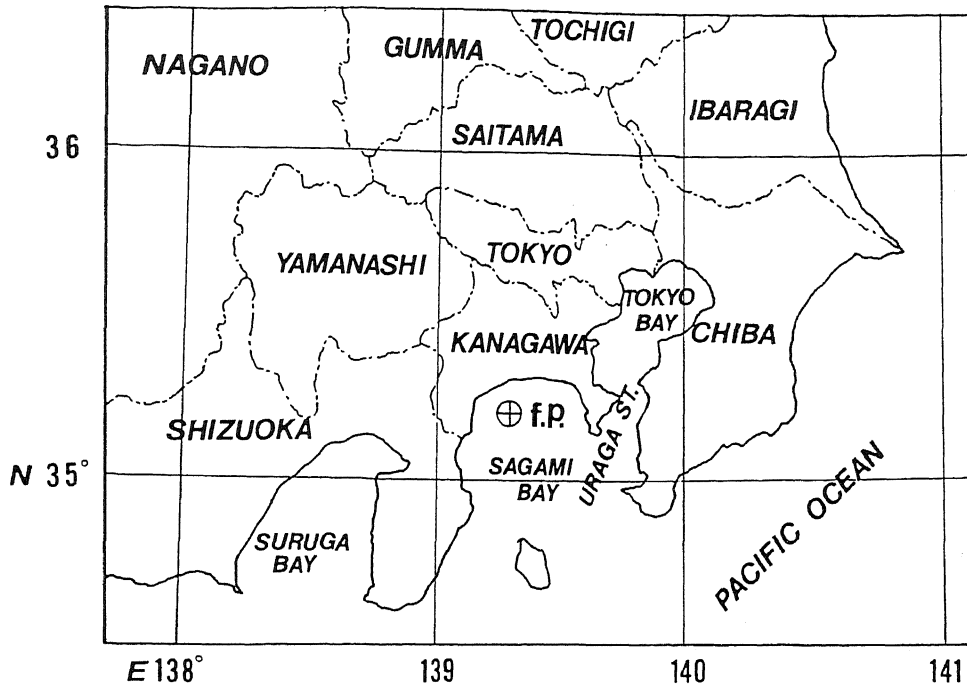


Fig.1 The Severe Zone in the Kanto Earthquake of 1923

From the viewpoint of geographical distribution, the loss is estimated as 3.78 billion yen, 68.6 percents of the total in Tokyo; 1.38 billion yen, 25.2 percents in Kanagawa prefecture; 0.11 billion yen, 2.0 percents in five adjacent prefectures of Shizuoka, Yamanashi, Saitama, Chiba and Ibaragi. The loss of facilities directly controlled by Imperial Family and Central Governments, amounting to 4.2 percents, mostly occurred in Tokyo and Kanagawa.

Change of income and income tax in 1923 FY comparing with those in 1922 FY is shown in table 2. The ratios of increments of income without considering economic growth are estimated as -6.0 percents in Tokyo; -18.3 in Kanagawa, -6.4 in Kanto district of the seven prefectures; 0.1 in the other districts; -2.0 in the entire country. The ratios of decrements of the tax are estimated as 6.0 percents in the entire country; 12.6 in Kanto; 2.1 in the other districts.

Displacements of population are shown in Table 3. A total number of dead and missing was 142,807 persons. Depending on the statistics as of November 15, which is two and a half months after the earthquake, a number of refugees was 3,300,279. Ninety percents of them were estimated as being temporary residents in Kanto.

Table 2. Change of Income and Income Tax

(Unit: thousand yen)

District	Income			Income Tax		
	1922	1923	Increment	1922	1923	Increment
Great Tokyo	1,027,664	965,697	- 6.0%	59,250	53,042	-10.5%
Kanagawa Pref.	171,999	140,557	-18.3%	9,822	6,168	-37.2%
Shizuoka Pref.	88,732	88,643	- 0.1%	3,209	3,147	- 2.0%
Yamanashi Pref.	25,478	26,594	4.4%	1,063	1,111	4.5%
Saitama Pref.	57,941	56,980	- 1.7%	1,934	1,921	- 0.7%
Chiba Pref.	58,630	59,663	1.8%	2,274	2,238	- 1.6%
Ibaragi Pref.	54,214	51,501	- 5.0%	1,535	1,491	- 2.9%
Sum	1,484,658	1,389,635	- 6.4%	79,087	69,118	-12.6%
Others	3,120,048	3,122,627	0.1%	133,768	130,947	- 2.1%
Grand Sum	4,604,706	4,512,262	- 2.0%	212,855	200,065	- 6.0%

Table 3. Displacements of Population

as of November 15, 1923

District	Estimated Pop. as of Sept. 1	Dead and missing	Refugees as of Nov.15	Population as of Nov.15	Change of Pop., Sept.1 to Nov. 15
Great Tokyo	4,050,600	70,497	1,495,926	3,634,199	△416,401
Tokyo City	2,265,300	68,660	1,021,956	1,527,277	△738,023
Locals	1,785,300	1,837	473,970	2,106,922	321,622
Kanagawa Pref.	1,379,000	31,859	1,024,071	1,242,532	△136,468
Yokohama City	442,600	23,335	254,556	311,402	△131,198
Locals	936,400	8,524	769,515	931,130	△5,270
Shizuoka Pref.	1,626,000	492	90,044	1,646,614	20,314
Yamanashi Pref.	602,000	20	34,144	611,812	9,812
Saitama Pref.	1,538,000	316	125,801	1,391,098	37,298
Chiba Pref.	1,347,200	1,420	194,318	1,400,655	53,455
Ibaragi Pref.	1,399,100	15	32,320	1,428,982	29,882
Sum	11,758,000	104,619	2,996,624	11,355,892	△402,108
others	46,723,500	0	303,655	47,047,877	324,377
Grand Sum	58,481,500	104,619	3,300,279	58,403,769	△77,731

note, △: decrease

After two and a half months, or on November 15, a decrement of population is estimated as 77,731. Substituting the dead and missing from it, a residual of 26,888 would mostly be natural increases. The decrease is estimated as 402,108 in Kanto, and the increase is estimated as 324,377 in the other districts. Other statistics are: a decrease of 738,023 in Tokyo city and an increase of 321,622 in local areas of Great Tokyo: a decrease of 131,198 in Yokohama city and decrease of 5,270 in local areas of Kanagawa prefecture, and an increase of 150,761 in the other five prefectures in Kanto.

As for unemployments it is estimated as 249,910, consisting of 174,475 males and 75,435 females, and also consisting of 209,137 perfect unemployment and 40,773 of imperfect one. A ratio of unemployment to employment is estimated as 15.7 percents in Kanto, 21.7 in Great Tokyo, and 21.4 in Yokohama city.

As seen from the above statistical information on income, tax, population, the effect of this earthquake disaster was so severe that they were felt throughout the entire country. Unemployment was a serious problem in Kanto district, in particular, in Tokyo and Yokohama.

#### INFORMATION ON LEGISLATIVE POLICIES AFTER THE KANTO EARTHQUAKE OF 1923

After the Kanto Earthquake, imperial ordinances were issued in order to maintain economic activities.

(1) Relief of Refugee

Imperial Ordinance No.396, Emergency Commandeering as of September 2, 1923  
Commandeering food, building materials, sanitary agents and carriers to relieve refugee

Imperial Ordinance No.420, Emergency Material Supply as of September 22, 1923  
House hold matters, and tools, machines and materials for construction to be sold, bought, exchanged and stored by the government

(2) City Planning

Imperial Ordinance 414 as of September 15, 1923  
Exception in Application of the City Building Codes to Temporary Buildings

Law of Special City Planning, Law No.53 as of December 24, 1923  
Items on Land Use Planning in Tokyo and Yokohama

(3) Trading Business, Finance, Taxation and Treasury

Imperial Ordinance 404 as of September 12, 1923

Moratorium on clearance of debt upto 30 days

Imperial Ordinance 405 as of September 12, 1923

Forbidding excessive profits

Imperial Ordinance 410 as of September 12, 1923

Exemption from or reduction of income tax and business tax, and reschedule of collection of tax

Imperial Ordinance 411 as of September 12, 1923

The government is able to compensate loss account of Nippon Ginko, the Central Bank of Japan, caused by discounting of bills (tegata) in severely damaged areas

#### DISCUSSIONS AND CONCLUSIONS

Nowaday, Japan's gross national product and national wealth can be estimated as much as 330 trillion yen and 1,426 trillion yen, which are respectively, 24,905 and 18,520 times those at the time of the earthquake. When a deflating index is assumed as one thousand at wholesale's price, a real amplification must be 24.9 and 18.5 times, respectively. On the other hand, the present population of 30 million in Kanto is three times, and 120 million in the entire country is two times to the population in 1923.

If we were to physically suffer from the same scale of an earthquake at the same location, we could estimate varied features of the hypothetical disaster or rehabilitation. However, a linear extrapolation of the experience in the Kanto Earthquake of 1923 may provide the following statements to the present situation.

(1) Material losses

A total amount of the material losses can be estimated as a figure between 102 and 137 trillion yen, if we assume, the same loss ratios of the earthquake in 7.15 percents of the current national wealth and 41.5 percents of the gross national product. The difference of 35 trillion yen between these figures tell us the change of Japan's socio-economic structure in these 64 years after the earthquake.

(2) Dislocation of population

A large scale dislocation of population can be estimated at 2.4 millions in downtown in Tokyo and in major cities of Kanagawa prefecture. About a half of them will move within Kanto District and another half except dead and missing to the other districts within two and a half months. In the confusion immediately after the earthquake, the ratio of unemployments will be raised by deficiency of equipments and reduction of skill workers.

(3) Countermeasures

Immediately after earthquakes it would be necessary to take the various measures in the legislative policy, even though there nowadays is an advancement of legal systems on disaster prevention. Therefore emergency relief systems and strategies of restoration and rehabilitation should be built up to prevent magnification of the disaster.

Not only the domestic countermeasure but also the effects in Japan's international relations after a large disaster should be evaluated by an advanced method with consideration a global change of socio-economic relations.

#### ACKNOWLEDGMENTS

The authors would like to express their sincere appreciation to the persons who recorded particularly detailed information on the statistics and legislation policy in the references listed in references. This study was conducted by the support of the Subsidy of Science Research Fund, Subject No. 62601006 and 63601007, provided by Ministry of Education, Science and Culture.

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