

STUDY ON THE STRUCTURE OF JAPANESE FROZEN FOOD MARKETING AND FOOD SYSTEM

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Abstract

Introduction :

In recent years, Japanese Frozen Food industry showed the highest growth rate during the period from the 1960s through the 1990s. And it have a close relationship between food demand and transition, have been expanding their industrial scale as well as the ratio between distribution and consumption.

After the 1960s, various structural changes have taken place in Japan, e.g. concentration of population in the urban areas, increase in number of employees working in the secondary industries, in the ratio of "nuclear families", and in the number of working women. These have brought about a general growth in the food industry^[*1].

And this study is considered that this trend has been caused by the socialized change in the Japanese frozen food market and manufacturing^[*2].

The situation will be discussed hereafter in details on the following four points :

- 1) Characteristics of Japanese frozen food industry and food system
- 2) Structural changes in frozen food industry on the retail level
- 3) Technology innovations in the frozen food field
- 4) Consideration and Propositions of incentive policies for development of the food system for Japanese frozen food industry

Key words : frozen food, food system, market and manufacturing,
technology innovations

1. Characteristics of Frozen Food Industry and Its System in Japan

According to the survey of the Japanese industries made by MITI (Ministry of International Trade and Industry) over the past twenty years from 1973 to 1992 shows that the frozen food manufacturing industry has greatly increased its share in the whole industries.

For example, the ex-factory production of the general food manufacturing industry grew by 2.34 times from 10,589 billion yen in 1973 to 24,754 billion yen in 1992. In a striking contrast, the frozen fishery products showed an increase by 17.4 times during the period from 1973 till 1992, and the frozen prepared foods products by 9.7 times.

It was a turning point for the food manufacturing industry in Japan to march into a new

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Table 1 Transition in Volume of Frozen Food Production for Institutional & Retail Uses

Year	1990	1991	1992	1993	1994	Average Yr.-to-Yr. comparison
Institutional (ton)	773,598	844,766	902,577	934,063	978,350	
Yr.-to-Yr. comparison (%)	109.1	109.2	106.8	103.5	104.7	106.7
Retail (ton)	251,831	261,304	300,036	329,138	340,810	
Yr.-to-Yr. comparison (%)	106.0	103.8	114.8	109.7	103.5	107.6
Total	1,025,429	1,106,070	1,202,613	1,263,201	1,319,160	
Yr.-to-Yr. comparison (%)	108.3	107.9	108.7	105.0	104.4	106.9
Institutional (%)	75.4	76.4	75.1	73.9	74.2	
Retail (%)	24.6	23.6	24.9	26.1	25.8	
Total	100.0	100.0	100.0	100.0	100.0	

Source: "Statistics on Various of The Japanese Frozen Food Industry 1994", Japan Frozen Food Association.

evolutional epoch, in terms of both the quantity and quality, through technological innovation.

Frozen food has shown a remarkable growth, with output increasing at an annual rate over 10% until the mid-1970s, and sales also increasing by at least the same amount till the early 1980s.

Although the growing speed has been somewhat slowed down, both the output and sales are still registering a 7 to 8% increase.

Despite the prolonged and severe recession of the Japanese economy, frozen food production is maintained a 4.4% increase rate since 1993, registering an annual product of 1.319 million tons for 1994.

In 1994, gross consumption of frozen food reached 1,820,199 tons, comprising 1,319,160 tons of the domestic product and imports of frozen vegetables amounting to 501,039 tons.

In 1994, there was an increase by 7.4% in the gross consumption from the previous year level at 1,695,019 tons. Average growth rate in recent five years was 7.5%.

The ex-factory domestic production amounted to 708 billion yen, showing a 3.6% increase from 1993. In 1969, the number of frozen food manufacturing factories increased

by 3.8 times to 973, from 256 in 1994^[*3].

The main characteristics of frozen food industry in Japan and the market situation are outlined as follows:

1) Frozen food are widely used by large food providing organizations such as schools, companies, and restaurants, etc. Table 1 shows the production ratio of frozen food by category in 1994.

Frozen prepared foods cover the largest share with 79.6%, followed by 8.5% for farm products such as vegetables and fruit, 7.7% for fishery products, 2.6% for confectionery, and 1.6% for livestock products such as poultry and meats. Usage by public institutions covered 74.2% of all domestic products, while the remaining 25.8% was for the retail factor.

And This trend was began from 1960s when the industry was initiated, and advancing more and more in 1980s and also in 1990s, and seems to have reached a plateau.

2) Main products of the frozen food industry are, frozen prepared foods including croquettes, hamburgers, meat-ball, shao-mai, chinese fried dumpling stuffed with minced pork (Gyoza), harumaki (Spring roll), pizza, rice

Table 2 Production Volume & Value of Frozen Food by Categories

	Category	Volume			Value		
		1993	1994	1994/1993	1993	1994	1994/1993
Fishery products	Fishes	29,851	30,396	101.8	26,990	25,092	93.0
	Lobster/Shrimp	18,325	18,624	101.6	15,641	16,270	104.0
	Crabs	7,574	7,684	101.5	12,155	12,241	100.7
	Squid & Octopus	29,210	22,070	75.6	26,158	20,082	76.8
	Shellfish	11,569	14,899	128.8	10,829	14,705	135.8
	Other fishery products	6,311	7,697	122.0	6,067	7,905	130.3
	Sub Total	102,840	101,370	98.6	97,840	96,295	98.4
Farm products	Taro (Satoimo)	.	3,560	.	.	1,390	.
	Carrot	.	10,516	.	.	2,216	.
	Stemmed corn	8,580	9,608	112.0	1,873	2,044	109.1
	Kernel corn	4,860	6,012	123.7	1,092	1,394	127.7
	Pumpkin	11,596	13,814	119.1	2,839	3,356	118.2
	French fried potato	21,598	18,141	84.0	4,082	3,374	82.7
	Other potato	22,521	20,598	91.5	3,598	3,129	87.0
	Spinach	7,135	6,928	97.1	2,063	1,815	88.0
	Other vegetables	35,783	20,778	.	9,581	6,738	.
	Fruits	2,500	2,855	114.2	1,080	1,118	103.5
Sub Total	114,573	112,810	98.5	26,208	26,574	101.4	
Livestock products	Poultry	4,198	3,908	93.1	3,129	3,020	96.5
	Meats	12,513	16,723	133.6	14,414	16,437	114.0
	Sub Total	16,711	20,631	123.5	17,543	19,457	110.9
Fried foods	Fried shrimp/lobster	10,354	11,226	108.4	16,886	16,749	99.2
	Fried squid	9,357	7,590	81.1	6,047	5,157	85.3
	Fried oyster	7,035	7,948	113.0	5,263	6,125	116.4
	Fried fishes	30,197	28,500	94.4	15,541	15,336	98.7
	Other fried fishery products tempura, fried food	39,686	43,585	109.8	30,222	32,493	107.5
	Croquette	148,046	155,174	104.8	44,790	47,797	106.7
	Cutlet	51,042	65,173	127.7	30,142	36,912	122.5
	Other fried food, tempura	86,646	97,017	112.0	48,304	53,278	110.3
Sub Total	382,363	416,213	108.9	197,195	213,847	108.4	
Prepared foods other than fried foods	Hamburger	64,532	62,103	96.2	37,436	35,251	94.2
	Meal ball	31,650	32,618	103.1	15,374	16,646	108.3
	Shao-mai	27,201	27,868	102.5	12,597	13,024	103.4
	Fried dumpling stuffed with minced pork (Gyoza)	15,392	16,113	104.7	6,905	7,903	114.5
	Harumaki (Spring roll)	19,459	22,518	115.7	10,255	11,431	111.5
	Pizza	12,950	16,313	126.0	13,008	16,080	123.6
	Chinese bun	8,149	9,909	121.6	3,544	4,189	118.2
	Rice products	119,070	106,465	89.4	58,663	55,382	94.4
	Noodles	92,993	110,598	118.9	22,240	25,872	116.3
	Bread & dough	.	19,990	.	.	10,792	.
	Kneaded fish products	10,688	9,001	84.2	6,589	5,437	82.5
	Egg products	31,129	28,787	92.5	15,791	14,405	91.2
	Gratin	20,254	24,975	123.3	12,469	15,196	121.9
	Stew, soup, sauce, etc.	16,734	17,704	105.8	9,847	11,006	111.8
Other prepared foods	134,433	128,807	.	96,253	88,737	.	
Sub Total	604,634	633,769	104.8	320,971	331,351	103.2	
Prepared foods Total	986,997	1,049,982	106.4	518,166	545,198	105.2	
Confectionery	42,080	34,367	81.7	23,513	20,485	87.1	
Sum Total	1,263,201	1,319,160	104.4	683,270	708,009	103.6	

* By the change of them, impossible to compare with previous year's figure.

Source: "Statistics on Various of The Japanese Frozen Food Industry 1994", Japan Frozen Food Association.

products, egg products, fried foods and prepared foods other than fried foods (See Table 2).

Frozen prepared foods are capturing larger and larger share of the frozen food industry year by year. In the 1960s, it was 40%. In the 1980s, it rocketed to 70%. And in recent years, it has grown to 80%. In contrast, market share of uncooked frozen food has decreased from 40 to 20%.

3) During the past 20 years, number of the product types has increased to reach 3,051 in 1994, covering a wide menu from hors d'oeuvres to desserts.

A majority of the new products are frozen prepared foods. As shown in Table 2, the top 5 items account for more than 30% of the total production quantity.

This shows that the production of frozen food is now concentrated in frozen prepared foods, making some types of vegetable more popular than others in the freezing process.

The large market share of the frozen prepared foods has been resulted by two factors: the first, is that the production and processing of frozen dinner requires easier technology.

The second is a socioeconomic factor: from the beginning, frozen prepared foods have found a ready market as side dishes for school lunches.

Reflecting the changes mentioned above, for example:

(i) Eating habits have been westernized, diversified and simplified in Japan by the dramatic economic growth of the country, encouraging the people to introduce the frozen prepared foods for a convenience in their lives. Then the new trend has spread from the urban area to the local cities and villages.

(ii) Rather than producing the frozen mate-

rials only, it is much easier to produce the frozen food by combining various food types with the materials. It also facilitates the quality control, because the products have already gone through the seasoning process.

(iii) A roundabout production method, value-added and discriminative pricing techniques are available for the frozen prepared foods.

(iv) For the fishery product industry, with its existing facilities already adaptable to frozen food production, has had no difficulty in acquiring the processing techniques and equipment, and easily converting to a mass-production of the frozen food.

(v) Changes in eating habits resulting from the high economic growth have brought about a great demand for frozen food from the food service industry.

4) In addition to the existing marine product manufacturers and specialized frozen food producers, newcomers such as dairy products and seasoning manufacturers have joined in the frozen food market since the 1970s.

These two newcomers were encouraged by the improved efficiency in the material procurement and the expanding consumer market.

5) In the industry, about ten major companies are leading the production and distribution of frozen food. Up to 70% of the total sales is shared by those ten foremost companies, almost as an oligopoly.

6) Most of the materials are imported from overseas.

7) There has been a rapid increase in importation of frozen vegetables, such as potatoes, beans, corn, spinach, bamboo shoots, taros, green soybeans, and mixed vegetables and so on.

During 1994, imported frozen vegetables imports exceeded 501,000 tons, which showed

Table 3 Imports of Frozen Vegetable by categories

Volume

(Unit : Ton)

Category Year	Potato	Beans	Sweet corn	Other vegetables	Total
1990	130,794	87,646	35,408	51,296	305,144
1991	144,486	101,755	36,537	104,244	387,022
1992	159,102	100,910	39,819	100,974	400,805
1993	155,433	104,784	42,365	129,236	431,818
1994	175,601	114,969	43,695	166,774	501,039
1994/1993(%)	113.0	109.7	103.1	129.0	116.0

Value

(Unit : ¥1 mil.)

Category Year	Potato	Beans	Sweet corn	Other vegetables	Total
1990	19,925	21,856	6,393	11,793	59,967
1991	20,105	20,101	5,817	18,425	64,448
1992	20,465	19,308	5,678	17,814	63,265
1993	17,678	17,300	5,481	19,468	59,927
1994	18,815	17,882	5,734	23,740	66,171
1994/1993(%)	106.4	103.4	104.6	121.9	110.4

Source: "Statistics on Various of The Japanese Frozen Food Industry 1994", Japan Frozen Food Association.

a 16.0% increase in volume and 10.4% increase in value (yen) compared with the previous year. Those imports satisfied about 80% of the domestic demand for the year 1994 (See Table 3).

Out of the imports, the heated and frozen sliced potatoes, which are the materials for fried potatoes, are mainly imported from the U.S.A., with the total reaching 152,000 tons for 1994.

Imports from the mainland China include are increasing, on spinach, taros and green soybeans, to cover 90% of the domestic requirement in Japan.

Locally procured items were limited to some products only: carrots with output 10,516 tons, pumpkins 13,814 tons, corns with stems 9,608 tons all for 1994.

Also under the pressure of growth,

the Japanese economy has a structural dependence on imports of frozen vegetables from above.

8) By the strong yen and combined with the globalized distribution system, an increasing amount of frozen prepared foods is entering the Japanese market year by year.

They include hamburgers, croquettes, meat-balls, shao-mai, Chinese fried dumplings stuffed with minced pork (Gyoza), harumaki (Spring roll), pizza, rice products, egg products and fried foods. Until very recently, all these items used to be produced solely inside Japan.

Such trend is clearly shown by the statistics for 1993 by the Ministry of Health and Welfare, indicating that 120,000 tons of the imported frozen food account for 9.5% of the total production of frozen food in Japan.

9) Apart from the increasing imports, some manufacturers of frozen food and trading companies have started overseas production of the foods, in the U.S.A., New Zealand, Thailand, Taiwan and the mainland China.

Their trade strategy is to hook-up with the local food manufacturers in those countries. Most of the products, made to the Japanese specifications, go to Japan, and then to the companies and supermarkets for public institutional uses there.

2. Structural changes regarding Frozen Food on Retail Level

The present great expansion of frozen foods and the development of their system were activated by the "Recommendation of Cold Chain System" originally proposed in January 1965 by the Science and Technology Agency, as well as the relevant policies announced subsequently.

The same "Recommendation" emphasized the importance of human health promotion and betterment of eating habits, by analyzing the problems and giving directions for the implementation of the proposal.

The analysis was made as follows:

Compared with other nations, the Japanese people generally take smaller quantity of perishable foods such as milk, dairy products, meat, eggs, fish, vegetables and fruits. These foods are prone to rot at the room temperature. On the other hand, people in Japan tend to consume more grains, beans and potatoes which can be preserved easily with salt.

This is one reason why the Japanese are on a lower level of health than the others. For an improvement, a more modern distribution system by refrigeration need to be introduced to Japan, for the people to take a high-protein diet practice.

The new system according to the Recom-

mendation proposes to implement various measures for systematic improvement of functions, such as the distribution system relating to processing, quality control, cold storage, transportation and inspection facilities for high-protein products.

A great importance is also laid on enforcing a comprehensive and systematic policy by the government to enhance the standard of household food preservation techniques, so that the market for frozen foods can be expanded further. That will allow the people to buy more and enjoy the advantages of frozen foods.

In Japan, the eating habits have been simplified considerably as a result of various structural changes in the society, such as the high economic growth, urbanization of local areas, increase in the number of nuclear families and of women as the work force. Consumption of frozen foods has thus been accelerated.

The proposals in the "Recommendation of Cold Chain System" can be summarized as follows:

- (1) To adopt a long-term view on the eating habits, based on the past changes.
- (2) To improve the distribution systems, and
- (3) To enhance a comprehensive and systematic policy to improve the eating habits.

The "Recommendation" suggests that these three points (1) (2) (3), when integrated, will increase the types of food that will need refrigeration, and will require the functional changes of the distribution system.

To cope with these needs, the following measures will have to be taken:

- (a) To upgrade the cold chain stores
- (b) To establish a classification system of foods and a system for the specification and inspection of foods
- (c) To prepare the information system for distribution of foods
- (d) To establish the production sites, depots,

and the processing system, and

- (e) To promote T-T T (Time-Temperature Tolerance) and P.P.P. (Products, Processing and Package).

Thus, the "Recommendation" asserts to tighten the relationship between rearrangement of the distribution system and promotion of people's health and enhancement of their quality of life.

The "Recommendation" have been followed by a rapid economic growth, including appearance of a large-scale process industry and modernization and rationalization of the food industry ^[*4].

The developing situation has encouraged the importation of foods. In particular, the improved refrigerated transportation system has resulted in increased importation of perishable foods from abroad.

Consequently, Japan is now the world's largest food importer, with 63% of her total food consumption depending on the imports (on the calorie basis). In 1994, the total import amounted to 25 million tons, with a ten-times increase from the level in 1984.

The growth in importations have seriously affected the domestic industries of agriculture, forestry & fisheries. In 1990, their share of the total food supplies dropped to 25.1% from 35.5% in 1970.

On the other hand, the food industry has increased its share has increased from 64.5% in 1970 to 74.9% in 1990.

3. Technology Innovations in Frozen Food Industry

Today, refrigeration process is applicable to almost all food types in some form. The traditional refrigeration used such materials as natural ice, chilled air and snow for storing the foods. The modern freezing system has been developed for storage of a large scale, and is

widely accepted by the food industry ^[*5].

While further development and progress have been made in the peripheral technology, freezing storage method is still regarded as an epoch-making technique among the innovative food preservation methods. Its unique point is in that the perishable foods can be stored, keeping their shapes and freshness.

On the other hand, food freezing food is defined as method where the food is refrigerated, whereas the frozen food, processed into a certain shape, is refrigerated. A heat exchange system slowly lowers the food and the condition the food temperature to a specified freezing temperature (-18°C).

Frozen food are packaged for the purpose of a long-term storage.

Objectives of freezing :

- (1) To store fresh foods, whereby the frozen fish, meat and vegetables maintain their original freshness for a specified period.
- (2) To store prepared foods.

Agricultural products upon their harvest will be frozen rapidly to maintain their original freshness and taste. They will be made ready for transportation to other places, for being stored there for use in the later seasons.

Basically, freezing technique is used for storing the foods under frozen conditions, and its technical limitations are less than those of canned or dried foods.

That is the reason why the freezing technology is now widely applied, with some socioeconomic advantages given to the food manufacturers and distributors in terms of the convenience, quality, uniform price, efficiency and a wide selectability of the products.

In view of the Time-Temperature Tolerance by the freezing method, attention should be paid carefully to the preservation period, considering such factors as the as the temperature, processing methods, content of the fat in

the food, and the packing method.

The processing and control technique are closely related to the electric devices and equipment. New concept of "Cold Chain System" has brought about an innovation to force the general food system to change drastically.

Specifically, development of the frozen food distribution system has made it an emergent need to research and study the following aspects :

- (1) processing and packaging method
- (2) quality control
- (3) storage
- (4) transportation
- (5) information

Relationships between the time and temperature for food preservation depend on the food types, growing conditions and period, as well as the handling methods even if they are of the same types of food, or the same food. And it is called Time-Temperature Tolerance. The lower the temperature is, the longer the preservation is made possible.

The foods are selected first, washed, cut and sorted for different purposes, then they are cooked before they are frozen^[*6].

The innovations processes can be classified as follows :

- (1) To establish a production control system, where the marketsuitability of each product is classified, and its production efficiency is studied. To develop the freezing techniques and the related equipment.
- (2) To reduce the cost of product maintenance, e.g. through development of new efficient display stands, etc.
- (3) To create new products by combining some existing products. To launch new publicity and advertisement campaign and new sales strategies^[*7].
- (4) To create new products based on very

unique concepts, such as fried foods to be frozen for cooking in microwave ovens, cooked rice to be frozen, and frozen noodles .

- (5) To improve the production procedures, such as changing the mixing ratio of materials.

Table 4 and Table 5 show the remarkable increase in the production of freezers and refrigerators following the advance of frozen food innovations.

Production of freezers/refrigerators rose by 50% during the period from 1982 till 1994. Freezers/refrigerators capable of freezing down to -2°C increased by 40%, whereas those for down to -20°C increased by 60%.

Technical innovations and development are required not only to meet the environmental changes for the frozen food distribution systems, but also to promote and further develop the various policies that were started during the 1960s, for the 1970s up to date.

To attain the objectives of the society, and redevelop the food industry, the following targets have been set up based on a system engineering concept, to establish a new frozen food system :

- (i) To readjust the frozen food distribution system
- (ii) To readjust the information system on the frozen food
- (iii) To establish the processing system, and
- (iv) To study on the food distribution^[*8]

As an example, the POS (Point of Sale) system has been introduced with two types of methods: first method is the Source Marking and the second In-store Marking.

Introducing of the POS system offers the following advantages :

- a) Manufacturers can grasp the consumers' needs of mass-production items and small-scale production items, so they are

Table 4 Refrigerator Production in Most Recent 5 Years

Year	Production	
	Volume (1,000 units)	Value (¥ million)
1990	5,048	457,674
1991	5,212	484,956
1992	4,425	440,230
1993	4,351	441,163
1994	4,952	495,627

Source: "Statistics on Various of The Japanese Frozen Food Industry 1994", Japan Frozen Food Association.

Table 5 Freezer Production in Most Recent 5 Years

Year	Production of freezers	Production in Value (¥ million)
1990	111,243	9,745
1991	128,970	11,308
1992	157,090	17,553
1993	146,558	16,336
1994	174,298	17,735

Source: "Statistics on Various of The Japanese Frozen Food Industry 1994", Japan Frozen Food Association.

allowed to set up the delivery schedules in small lot, and

b) At the stores, the cashiers' input operations enable a complete product management for pinpointing the customers' needs.

Thus, the POS system has allowed the manufacturers and supermarkets to be on top of the trends of consumer demand, ensuring an efficient production and its management.

Further to the POS system, innovative measures are promoted in the distribution management, with the research being concentrated on systematic transportation.

Above all, it is most important to effective-

ly develop the transportation techniques as the frozen food is increased in volume, making a nationwide delivery service more and more necessary.

Such development will include a). to unify the loads of small cargoes, b). to cooperate with different transport organizations on an interactive basis, c). to develop a new storage method and, d). to improve the techniques of cargo selection and loading/unloading.

The expanding distribution systems helped the chilling and refrigeration industry as well as the related truck transportation industry.

Tables 4 shows clearly the increase in number of the equipment and vehicles.

4. Considerations of Policies for Food System Development and Frozen Food Industry in Japan

Systematic promotion of the Cold Chain System seems to have the following eight points related to the structure of frozen food market ^[*9] in Japan :

- 1) Promotion of the frozen food distribution systems is beneficial for promoting the food storage systems.
- 2) System management helps minimize the food perishable.
- 3) Distribution systems help stabilize the food price level^{[*10] [*11] [*12]}.
- 4) Standardization of the food and unification of pre-cooking techniques will improve an effective resource utilization.
- 5) Distribution of frozen food is facilitated.
- 6) Frozen food facilitate the cooking procedures.
- 7) Cold Chain System will have a rippling effect on the whole country from a socioeconomic aspect. Widespread of frozen food industry has pervasive effects not only on the expansions of business by frozen food manufacturers and distributors, but also on the whole food industry and its related industries as well. Thus, it will bring about a wider socioeconomic scope.
- 8) On the other hand, strong waves of international business are pounding against Japanese economy, including the frozen food business. Import of resources and materials from overseas is increasing, to threaten the domestic agricultural and marine production year by year.

The more materials are imported for the food market of Japan, the more closely the food market will be related to the distributors as

well as the supermarkets and dining-out (food service) industry. To respond the people's expectation of new eating habits to be formed, the policies for agriculture, forestry and fishery industries in Japan must be reviewed from a long-term viewpoint, by reinforcing the self-efficiency of agriculture and fostering the local industries. At the same time, the food distribution system needs to be reorganized on an international basis.

It is important to keep watching how systematically the frozen food industry of Japan is developed and promoted. In other words, we must endeavor to change the structure of frozen food industry in this country, to keep pace with the globalized food industry of the world, and in a harmonious and flexible manner.

Also important is to ensure a maximum development within Japan of the relationship between the agriculture, forestry & fisheries and frozen food industry through effective policies and food system.

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- [* 2] A frozen food refers to the food which is pre-processed, frozen rapidly, and kept at below -18 °C. Imported frozen food are excluded from the statistics surveyed by the Japan Frozen Food Association, except for the following items which are regarded as the frozen food produced in Japan :
 - a) Ice cream and the like
 - b) Frozen materials such as frozen minced fish and meat
 - c) Chilled fish after being defrosted
 - d) Imported vegetables that are frozen in Japan
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