

CURRENT SITUATION AND ISSUES OF FOOD PROCESSING INDUSTRY IN TAIWAN*

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I、Introduction

Food markets in Taiwan provide superior environment for the development of food processing industry under several economic, social, and policy conditions in the last decade. The growing per capita income, the changes of consumption behavior, the macroeconomic condition, and the government policy of supporting strategic food processing are of four major factors to ensure a sound environment and future expectation of food processing industry in Taiwan. To shed some lights on the background conditions, further explanation are conducted below.

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The per capita income growth in the last decade was significantly larger than that of population. When the population increased only 11.6 percent from 1981 to 1990, per capita income increased from 2,669 to 7,997 U.S. dollars in nominal term, i.e. almost two-fold increase. The great improvement in per capita income has induced the demand for better food quality and more nutritious products. Foods like meats, dairy products, baked products, candies, beverages, and tobacco have become dominant industries as for the nutritious as well as luxury consumptions. However, not all food processing industries are developing steadily with the increased per capita income.

To satisfy the rapid changes of consumer motivation toward products with more dependable, higher nutrition, more time saving, and greater variety, the marketing system, especially the styles of food outlets, have changed and expanded. These changes in food outlets can be proved by the rapid expansion of convenient chain stores and small-to-large scale composite supermarket chains in Taiwan. Not only the style of these stores but also the methods of operation are originally induced from foreign countries such as Japan, U.S.A., and some European countries. More varieties including imported products can be found in these stores with popular brand names and better packaging outlook to attract all consumers in major townships. As a result, the market share of traditional style in food sales are gradually lost to and replaced by modern and convenient markets.

The development of Taiwan's macroeconomic environment further supports the growing potential for food processing industry. The high growth rates of money supply in the 1980s stimulated consumer prices and depressed interest rates. The consumer price levels, however, were not a serious problem on average because of the gradually liberalized domestic markets as well as the increase of foreign imports. In 1981, the consumer price was increased 16.3 percent from the prior year. Monetary growth was then contracted to certain degree before 1984 which produced an average of 2.2 percent increase in consumer price index between 1986 and 1990. The significant increase of monetary growth in 1986 was not considered to be detrimental to inflationary control by the Central Bank. Despite the low inflation rate, the wage rate for the food industry increased 41.1 percent between 1986 and 1990 which squeezed out some of the profit margins and increased the competition for the related industries. On the other hand, the discount rates decreased from 11.8 percent in 1981

to 4.5 percent between 1986 and 1988. Lowered interest rates decreased production costs which compensated some wage increase and pushed up the domestic demand of processed food.

Moreover, The global exchange rate change in 1985 after the G-7 meeting which significantly revalued the relative value of the New Taiwan (NT) dollar to the U.S. dollar twice in the early 1986 and the late 1987. The food processing industry thus became less competitive in the world markets and faced more foreign competition in the domestic markets. More foreign products appeared in Taiwan's markets which has pressured the adjustments of domestic food sector toward more efficient operation and more inventions to deal with increased competition.

The development of food processing industry was acknowledged by the government under the policy of improving value-added for farm products (Council of Agriculture 1986). Since the early 1980s, Taiwan's farmers have been suffering from the oversupply of agricultural outputs. Output diversification and educational programs were introduced to help solving the problems. The important complementary policies were to improve the outlets of farm products and the food processing technology. In so doing, the consumption of more farm outputs as well as the stabilization of farm prices were anticipated to achieve at an acceptable level. Considering the tremendous profits that could be involved in the newly created processed food and related drinks, food processing research and development has been greatly promoted by the government.

The development of Taiwan's food industry was mostly influenced by the above four factors in the past decade. The over-time adjustments of related industries can be exposed from the historical data. The following section will provide historical point of view on Taiwan's food processing industry.

II、Historical Situation of Taiwan's Food Processing Industry

Major statistical data and researches of Taiwan's food processing industry are collected and conducted by the Food Industry Development and Research Institute (FIDRI) in collabo-

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rate with university professors since 1988. The funding supported largely from the Council of Agriculture (COA), and some from the Council for Economic Planning and Development (CEPD) and the Bureau of Health (BH) of the Executive Yuan.

Table 1 shows the role of food processing industry in Taiwan's industrial sector. The industrial sector has been growing nearly 63 percent in sale's value steadily from 1981 to 1989. The manufacturing sub-sector accounted for the major portion of the industrial sector and had the growth of 67 percent during the same time period. Despite of the decreased share of food industry in total manufacturing output from 11.20 percent in 1981 to 8.34 percent in 1990, the output value of food industry increased from 281 billion NT dollars in 1981 to 348 billion NT dollars in 1990, i.e. a 23 percent increase. Moreover, food industry sector showed increased share in total manufacturing sector significantly from 7.96 percent to 8.34 percent between 1988 and 1990.

Inside the food processing sector, the major growing industries are slaughtering, dairy product, baking, candy, wheat flour, tea, flavoring essence, noodle, beverage, and tobacco. Most of these industries other than beverage and tobacco share significant portion of Taiwan's food industry. Other important industries in the range of processed food products with decreased sale's value are canned food, frozen food, dried food, soaked food, edible vegetable oil, and tea processing.

Except beverage and tobacco, the sale's value of the slaughtering industry dominates all listed 22 industries. The rapidly growing fast food industry including both western and Chinese styles in the mid-1980s could be a good reason for the explanation of more consumption of slaughtered meats. The combination feeds had the second highest sale's value among the food processing industries. In addition, the growing fast food and other restaurant businesses also increased the consumption of beverage and tobacco. In 1990, the sale's value of beverage and tobacco was about one-third of food industry. The imported beverage and tobacco products created a very competitive situation in the domestic markets.

Several food processing industries also exhibit great growing strength. Dairy products were provided in a very widespread retail outlet mostly to meet the nutritious intake. Soaked food products created various tastes of many agricultural products for consumers. Wheat and rice products including noodle are largely utilized in the consumption of daily

meals. In addition to the home cooking usage, many flavoring essences were also applied to almost all pre-cooked and instant foods. Other industries such as candy and baking are also growing rapidly as luxury and quality food.

Four major food industries in Table 1 show great potential future development. They are the dairy product, frozen food, edible vegetable oil, and tea processing industries. All the above four industries possess the necessary qualifications for further development. Dairy product and tea processing industries showed steady growth in the historical data. From the nutrition point of view, it is not surprising for the rapid expansion on dairy product sale. The growth of tea product sale in the domestic market was especially supported by the increasing population of tea consumption under the increased per capita income and the changes of life style. Although frozen food and edible vegetable oil industries have decreased sale's value over time, they maintain great potential of development in the future. Many Chinese style prepared frozen products are developed and heavily financed by the government to catch the possible new market shares of increasing consumption population. The promotion of healthy way of eating in Taiwan also opened more space for the invention of refinery vegetable oil products.

As long as the domestic food markets are expanding over time, the trade structure of food products has been changed. Export value of processed food increased from 1982 to 1987 and decreased nearly 18 percent between 1987 and 1990, Table 2. The import value of processed food, on the other hand, increased nearly 75 percent from 1982 to 1988. The last two years of imports showed unstable figures which implied the appearance of great competition in the domestic processed food markets.

Among the exported processed food products, the performance was not equal among the important product categories, Table 3. Only fresh or frozen meats, edible vegetable oil, dried food, and baked food and candy had increased exports during 1988 and 1990. The exports of ice cream and ice cream powder increased significantly in 1990. The exports of tea products have been decreasing after 1986. Moreover, the export of frozen food was encouraged in the mid-1980s but kept at around 40 billion NT dollars per year after 1987. Other products showed very unstable movements in the world markets except the rapid decrease in canned food exports.

As to the imported processed food products, most categories showed increased sales in

Table 1. Sales of Food Processing Industries in Taiwan

Unit : NT\$ Mil.

Year	Total Industry	Manufacturing Sector	Food Industry	Slaughtering	Dairy Product	Canned Food	Frozen Food
1981	2 756 349	2 514 914	281 689	79 523	8 491	17 416	20 525
1982	2 726 056	2 501 012	288 278	51 628	9 314	14 633	29 756
1983	3 022 974	2 799 017	304 769	54 154	9 632	15 377	34 043
1984	3 463 575	3 217 196	320 967	57 038	9 585	15 649	34 300
1985	3 448 057	3 191 547	331 202	58 061	8 269	14 694	45 632
1986	3 752 765	3 500 917	322 202	53 029	9 087	13 972	52 787
1987	4 076 179	3 818 087	329 120	53 969	9 776	11 906	63 306
1988	4 277 589	4 006 607	318 987	57 137	10 189	11 117	41 472
1989	4 500 556	4 207 229	337 512	62 849	10 715	10 250	31 724
1990	4 486 630	4 166 928	347 557	70 830	12 018	7 409	31 419
			(100.0) ^a	(20.4)	(3.5)	(2.1)	9.0

Year	Dried Food	Soaked Food	Boling	Candy	Edible Vegetable Oil	Wheat Flour	Rice Husking
1981	3 294	5 391	3 531	1 770	5 657	17 156	46 369
1982	3 521	6 209	4 298	2 327	7 515	18 511	49 573
1983	3 326	5 866	4 748	2 483	8 270	21 088	48 616
1984	4 012	4 956	5 191	2 714	8 905	21 667	45 243
1985	4 218	4 069	6 191	3 217	11 473	20 695	41 304
1986	4 619	4 031	6 627	3 648	11 390	20 826	36 470
1987	5 484	4 509	6 881	3 683	8 186	22 383	33 754
1988	5 589	3 654	7 324	4 258	7 365	23 511	35 881
1989	3 829	5 289	10 766	5 817	6 881	28 450	42 704
1990	3 558	5 144	11 889	5 428	7 977	26 847	42 544
	(1.0)	(1.5)	(3.4)	(1.6)	(2.3)	(7.7)	(12.2)

Year	Sugar Refineries	Tea Processing	Flavouring Essence	Flavouring Essence	Combination Feeds	Noodle	Other Food
1981	16 528	1 630	3 516	4 181	63 135	3 261	10 515
1982	11 685	1 223	3 234	4 692	55 821	3 505	10 833
1983	12 699	1 294	3 516	4 681	58 124	4 175	12 719
1984	12 656	1 579	4 551	4 585	66 880	4 404	16 445
1985	11 158	2 552	4 547	4 560	66 295	4 974	19 567
1986	10 358	1 904	5 333	3 804	57 247	5 652	21 934
1987	12 823	2 369	4 537	4 420	53 128	5 414	22 293
1988	13 327	2 352	6 121	5 120	53 883	6 440	25 143
1989	11 465	3 383	5 089	5 427	58 320	7 687	26 563
1990	11 762	4 491	4 993	6 069	56 171	8 159	31 002
	(3.4)	(1.3)	(1.4)	(1.7)	(6.2)	(2.3)	(8.9)

Year	Beverage & Tobacco	Spirits, Wine & Malt	Beer Brewery	Non-Alcohol Beverage	Tobacco
1981	61 560	11 997	11 779	10 946	26 588
1982	68 664	13 869	13 869	13 651	27 678
1983	74 522	13 982	16 982	16 845	29 456
1984	79 746	16 713	16 713	16 414	31 808
1985	79 735	19 567	17 219	16 153	30 710
1986	82 370	21 934	17 470	15 411	32 174
1987	87 028	22 293	19 843	19 427	28 897
1988	92 295	25 143	22 513	21 612	28 479
1989	103 757	26 863	25 052	26 679	30 554
1990	111 921	26 521	26 521	32 876	30 041
	(100.0) ^b	(23.7)	(20.1)	(29.4)	(26.8)

a. Number in parenthesis indicates percentage of the total food industry in 1990.

b. Number in parenthesis indicates percentage that each of the four sub-groups represents of beverage & tobacco in 1990.

Source : Food Industry Development and Research Institute, Food Industry Statistical Information, June 1991.

Table 2. Traded Value of Processed Food Industry in Taiwan

Unit : NTS Mil.

Year	Export	Import	Surplus
1982	46 586	25 477	21 109
1983	48 219	29 462	18 757
1984	50 975	33 408	17 567
1985	54 523	32 756	21 767
1986	72 903	39 310	33 593
1987	78 793	40 273	38 520
1988	66 707	45 768	20 939
1989	64 012	37 997	26 015
1990	64 920	40 688	24 232

Source : Food Industry Development and Research Institute, Food Industry Statistical Information, June 1991.



Table 3. Export Value of Food Processing Industries in Taiwan

Unit : NT\$ Mil.

Year	Slaughtered Meat (Fresh or Frozen)	Husked Food	Sugar & Honey	Edible Vege- table Oil	Flavoring Essence
1982	138	2 524	3 897	107	1 348
1983	317	3 821	1 701	41	1 150
1984	824	1 697	1 230	374	1 651
1985	944	347	1 165	49	1 967
1986	1 706	824	1 187	263	2 515
1987	2 609	1 111	234	90	2 313
1988	2 487	739	232	203	2 810
1989	2 572	828	360	220	2 285
1990	2 991	850	233	455	2 858

Year	Combination Feeds	Frozen Food	Dried Food	Soaked Food	Processed Meat
1982	31	15 469	3 652	2 882	45
1983	48	19 552	2 693	2 638	63
1984	100	22 829	2 854	2 482	78
1985	73	29 539	2 925	2 463	98
1986	162	43 248	3 388	2 806	106
1987	687	52 340	3 222	2 875	76
1988	2 064	41 935	3 031	2 936	40
1989	2 273	39 732	3 347	2 954	84
1990	1 641	42 301	3 450	2 431	37

Year	Processed Seafood	Dairy Product	Canned Food	Baked Food & Candy	Tea & The Replacement
1982	240	1.2	13 892	961	634
1983	483	1.4	13 234	1 137	722
1984	567	1.5	13 459	1 149	926
1985	677	0.3	11 395	1 173	985
1986	756	1.0	12 460	1 429	1 112
1987	660	2.0	9 338	1 256	945
1988	652	4.5	6 645	1 290	720
1989	257	3.7	5 955	1 514	583
1990	282	20.6	4 146	1 693	538

Year	Other Food	Beverage with Alcohol	Beverage With- out Alcohol	Tobacco
1982	763	117	523	3.3
1983	607	154	690	3.2
1984	753	118	381	5.4
1985	721	187	262	4.0
1986	941	184	340	5.2
1987	1 035	140	448	3.2
1988	920	184	435	6.0
1989	1 044	169	322	82.8
1990	992	184	357	3.7

Source : Food Industry Development and Research Institute, Food Industry Statistical Information, June 1991.

Table 4. Import Value of Food Processing Industries in Taiwan

Unit : NT\$ Mil.

Year	Saugtered Meat (Fresh or Frozen)	Husked Food	Sugar & Honey	Edible Vege- table Oil	Flavoring Essence
1982	4 279	325	448	1 251	55
1983	5 993	414	716	1 769	76
1984	7 661	889	810	1 837	109
1985	7 529	810	667	1 634	149
1986	11 519	642	1 247	1 583	181
1987	11 613	574	1 180	1 386	205
1988	10 476	733	906	1 675	383
1989	367	922	768	2 104	551
1990	221	1 288	1 241	2 538	806

Year	Combintion Feeds	Frozen Food	Dried Food	Soaked Food	Processed Meat
1982	441	2 838	2 616	273	1 154
1983	594	3 272	1 830	276	1 334
1984	540	3 598	1 852	197	1 312
1985	536	3 725	2 414	173	810
1986	709	4 119	2 145	24205	435
1987	939	4 139	2 141	1	342
1988	1 092	5 830	3 159	321	433
1989	431	6 220	3 277	530	435
1990	528	6 580	2 680	540	393

Year	Processed Seafood	Dairy Product	Canned Food	Baked Food & Candy	Tea & The Replacement
1982	4 457	5 464	249	436	10
1983	4 600	5 794	319	685	11
1984	5 474	5 851	410	759	12
1985	4 933	5 988	396	713	31
1986	5 837	6 028	471	958	44
1987	7 063	4 922	782	1 288	59
1988	8 029	5 167	1 056	2 469	112
1989	7 153	7 904	1 394	3 263	127
1990	7 013	7 997	1 681	2 475	151

Year	Other Food	Beverage with Alcohol	Beverage With- out Alcohol	Tobacco
1982	1 180	805	227	135
1983	1 753	1 358	213	354
1984	2 097	1 195	226	369
1985	2 249	1 351	302	422
1986	3 151	836	317	374
1987	3 368	2 545	357	3 871
1988	3 927	1 774	609	4 188
1989	2 529	1 969	760	3 833
1990	3 558	2 471	885	3 317

Source : Food Industry Development and Research Institute, Food Industry Statistical Information, June 1991.

the domestic markets, Table 4. The only exceptions are the fresh and frozen meats, dried food, processed meat and seafood, and tobacco. The most significant increase of imports in recent years was the flavoring essence product category. Husked and soaked food, edible vegetable oil, frozen food, dairy product, canned food, baked food and candy, and tea product categories also had significant growth of imports. Among these product categories, frozen food had just nearly 13 percent of growth over the latest three years because of domestic high competition. The beverage category without alcohol also showed significant growth in imports.

Other than the growing sales of the food industry, the demand for various kinds of containers for processed food products also has become important industry without any doubt. The demand for food packaging materials such as glass, metal, bottle, paper, plastic, aluminum, and other imported soft packages is the derived demand for processed and convenient foods. The demand for higher quality food packaging including the contents and designs of packages was further stimulated as an economic movement approaching affluent society. According to the midterm report of Lee et. al in 1990, the food packaging industry in Taiwan was at the developing stage. This industry was expected to have tremendous growth in the forthcoming decade.

III、Current Situation of Taiwan's Food Processing Industry

Reports on the current situation of food processing industry were performed in FIDRI with the help from various research institutes in Taiwan. The major research subjects were concentrated on fourteen food processing industries within seven major categories which were acknowledged as strategic food processing industries.

The most recent available information on market structure, behavior, and performance of these seven categories are synthesized in Tables 5, 6, and 7. The degree of concentration, entrance barrier, vertical integration, and firm growth rate indicators are used to explain market structures. Firm behavior is described by the policies of pricing, product, and market expansion adopted in each industry. Finally, the industrial performance is expressed by in-

dicators of profit rate, productivity, and technology progress.

3.1 Market Structure of Food Processing Industries

The concentration ratio (CR) in this paper is defined as the sale's value of top four firms divided by total industrial sale's value. Only dairy, frozen prepared meat, frozen prepared fruit and vegetable, and fruit juice industries had the concentration ratio higher than 60 percent and were categorized as highly concentrated oligopoly markets (table 5). Frozen prepared food and soybean oil industries had the concentration ratio fallen between 30 and 60 percent and were categorized as medium level concentrated oligopoly markets. The fast food, tea, peanut oil, and sesame oil industries appear to be very competitive markets.

The entrance barrier can be explained by product differentiation and economies of scale. Product differentiation is hard to measure and is replaced by the advertising density which representing the desire of firms to differentiate their products. The higher the products are differentiated, the more difficult the new firm to enter. The dairy, frozen prepared food, and fruit juice industries had the advertising density over 3.5 percent and were categorized as extremely high product differentiation. Other industries including the frozen fruit and vegetable, food packaging, soybean oil, peanut oil, sesame oil, rice bran oil, and margarine industries exhibit low rates of product differentiation.

The economies of scale could be simply represented by the ratio of average plant output over total industrial output which becomes the reciprocal of firm numbers. The dairy, frozen prepared food, frozen prepared seafood, frozen fruit and vegetable, fruit juice, soybean oil, peanut oil, sesame oil, and rice bran oil industries had the index of scale economies lower than 5 percent and did not show entrance barrier in the economies of scale.

For the vertical integration, backward and forward integrations are measurements for the strength of marketing expansion. Backward integration is defined as the percentage of major inputs supplied by own related firms. Only dairy, frozen seafood, and frozen meat industries showed the larger degree of backward integration. Forward integration is proposed as the percentage of output sales from own outlets. The fast food industry dominated other industries in forward integration. The dairy, frozen prepared food, frozen meat,

Table 5 Market Structure of Food Processing Industries in Taiwan

Industry	Degree of Concentration		Entrance Barrier		Vertical Integration		Average Firm Growth Rate		References
	Ratio (%)	Type of Market	Product Differentiation (%)	Index of Scale Economies (%)	Backward Integration (%)	Forward Integration (%)	Production (%)	Value (%)	
(A) Dairy	80.5*	Highly Concentrated Oligopoly	3.9c	0.53	33.2d	30.9d	12.9d	13.0d	Wu, 1990
(B) Frozen Food									
1. Prepared Food	36.0b	Medium Level Concentrated Oligopoly	6.7b	2.13*	Very Low*	23.0b*	29.3b	82.5b	Young et. al. 1988 Shiu et. al. 1990
2. Seafood	NA	NA	NA	1.00*	14.87*	1.67*	8.45*	NA	Yuang 1988
3. Meat	77.81*	Highly Concentrated Oligopoly*	NA	NA	17.00	30.00*(f)	18.36*	NA	Ho, 1989
4. Fruit & Vegetable	67.4b*	Highly Concentrated Oligopoly*	0.97*	1.79*	NA	0.00*	15.80*	NA	Wu et. al. 1989
(C) Fast Food	Low	Competition	NA	NA	Very Low	100.00	NA	34.00	Lee and Chang 1990
(D) Tea**	Low	Competition	NA	NA	NA	21.25	NA	NA	Shiu et. al. 1990
(E) Fruit Juice**	60.51	Highly Concentrated Oligopoly	15.10	1.82	2.00	7.60	47.90	NA	Fu et. al. 1990
(F) Food Packaging	NA	NA	0.75	NA	NA	NA	NA	7.50	Li et. al. 1990
(G) Edible Oils & oils									
1. Soybean Oil	30.2b	Medium Level Concentrated Oligopoly	0.37**	1.22**	Very Low	Very Low	NA	Low	Shiu et. al. 1990
2. Peanut Oil	Low	Competition	0.52**	0.57**	Very Low	46.80	NA	NA	Shiu et. al. 1990
3. Sesame Oil	4.7**	Competition**	0.23**	0.76**	Very Low**	36.0b	189.00**	NA	Shiu et. al. 1990
4. Rice Bran Oil	NA	NA	Very Low	6.04	Very Low	12.50	5.5b	9.0b	Shiu et. al. 1990
5. Margarine	NA	NA	0.34**	NA	NA	7.0b	NA	NA	Shiu et. al. 1990

Source: Various research reports of FIDRI in Taiwan, 1988-1990. 1989's data except otherwise indicate.

* 1987 data

** 1988 data

NA: Not available

(a) Largest four firm's sales over total industrial sales

(b) Represented by the advertising density which is calculated by dividing advertising expenditure to total sales of the entire industry

(c) The index is represented by the percentage of the reciprocal of total number of firms in the industry

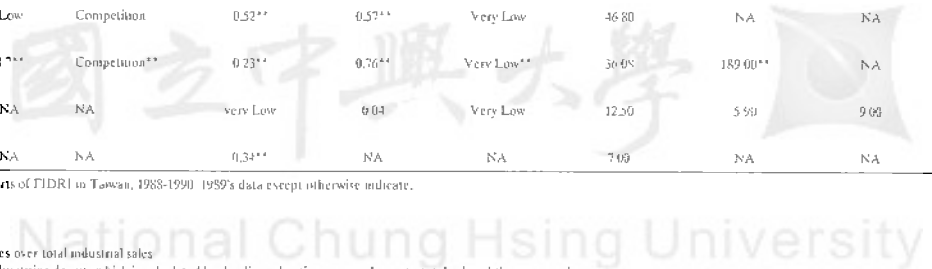
(d) Average percentage of major input material supplied by own related company.

(e) Average percentage of sale's value from the outlets of own company.

(f) For dairy industry the growth rates are the average of 1987-1989; other industries' percentages are for domestic market only

(g) For pork meat only

(12)



tea, peanut oil, and sesame oil industries showed significant forward integration while the frozen seafood, frozen fruit and vegetable, fruit juice, soybean oil, rice bran oil, and margarine industries had very low level of forward integration.

The growth in production and value implies the future development of specific industry. Among these industries, sesame oil had nearly 1.89 fold of production growth in 1988. The dairy, frozen prepared food, frozen meat, frozen fruit and vegetable, and fruit juice industries showed great future potential of growth. Comparing the growth of production and output value, frozen prepared foods were developing value-added products successfully while the dairy foods also had the potential. The growth of sale's value in fast food industry further proved the changing consumption pattern and habits in recent years.

Several conclusions on the market structure of the food processing industry in Taiwan can be drawn. The degree of concentration is positively correlated with the level of vertical integration. Frozen food sub-sector exhibited significant growth in either production or sale's value and frozen prepared food industry showed developing trend toward more highly value-added products. The frozen prepared food industry, nevertheless, showed the largest average economies of scale and significant level of product differentiation which constrain the freedom of new entrance. Other than frozen prepared food industry, fruit juice industry also exhibited high level of entrance barrier.

3.2 Firm Behavior of Food Processing Industries

The most popular pricing strategy of food processing industries were cost mark up and demand orientation (table 6). For demand orientation strategy, the popular method was market price competition. The cost mark up strategy dominated that of demand orientation in the dairy, frozen prepared food, frozen meat, frozen fruit and vegetable, fast food, fruit juice, food packaging, and sesame oil industries. The firms in frozen seafood and tea industries were price takers in very competitive markets. Moreover, industries having significant export markets adopted price negotiation with traders or foreign buyers while some products in the frozen meat industry utilized the cost mark up method.

Table 6. Firm Behavior of Food Processing Industries in Taiwan, 1989.

Industry	Pricing Strategy	Product Strategy	Expansion Strategy	References
(A) Dairy	Cost mark up(58%) Cost follower(35%)	Quality(88.7%) Taster(77.3%)	Marketing network(77.1%) Public reports Direct sale	Wu 1990
(B) Frozen Food				
1. Prepared Food	Cost mark up(61%)* Composition(26%) Demand orientation(13%)	Quality(50%)* Reasonable price(23%) Taster(20%)	Advertisement(22%)* Food taste(20%) Extension(14%)	Yung et. al. 1986 Shiu et. al. 1990
2. Seafood	Price competition*	Quality(91.69%)	Domestic* Direct sale Export Trader & foreign buyer	Yuang 1988
3. Meat	Domestic* Cost mark up(43%) Demand oriented(27%) Competition(22%) Export: Negotiation(44%) Cost mark up(31%)	Input quality* Packaging Brand name	Advertisement* Extension Open Taste	Hu 1989
4. Fruit & Vegetable	Cost orientation* Demand orientation Negotiation with foreign buyers	Quality* Reasonable price Taste	Direct sale* →Domestic(33.3%) →Foreign(70.4%) Extension	Wu et. al. 1989
(C) Fast Food	Cost mark up	Reduce Cost New products R & D	NA	Lee and Chang 1990
(D) Tea**	Competition	NA	Direct sale: Supermarket(41%) Own outlets(29.41%)	Shiu et. al. 1990
(E) Fruit Juice**	Cost mark up(37.9%) Demand orientation(47.8%)	Quality(86.7%) Taste(80%) Reasonable price(50%) Packaging(36.7%) Low price & stable supply(33.3%)	Advertisement Direct sale* Supermarket & retailer(36%) Dealers(28.1%) Own outlets(18.0%) Extension	Fu et. al. 1989
(F) Food packaging	Cost orientation(23.3%) Demand orientation(16.7%) Export(10%)	Quality Reasonable price Cost reduction New products	Advertisement Labor management Developing microwave packages R & D	Li et. al. 1990
(G) Edible fats & oils				
1. Soybean Oil	Demand orientation(59.16%) Cost mark up(79.26%)	Importation(43.5%) New products	Direct sale Foreign investment	Shiu et. al. 1990
2. Peanut Oil	Demand orientation(50.03%) Cost mark up(46.9%)	NA	Foreign investment Diversification	Shiu et. al. 1990
3. Sesame Oil	Cost orientation(52.3%)** Demand orientation(10.62%)	NA	New products**	Shiu et. al. 1990
4. Rice Bran Oil	NA	Diversification	Production for industrial use Collecting by-products	Shiu et. al. 1990
5. Margarine	NA	NA	New products** Direct sale	Shiu et. al. 1990

Source: Various research reports of FIDRI in Taiwan, 1988-1990

* 1988 data

** 1988 data

NA: Not available

For the product strategy, most important actions were improving product quality and tastes, inventing new products, and setting up reasonable prices. Industry like frozen meat had most outputs exported to foreign countries request high quality of raw input materials. Industry such as soybean oil required large amount of imported raw materials would consider the import union to control the input sources and lower input costs. Moreover, industries facing very competitive fixed-type products would struggle for invention of new products.

The strategies employed to expand market shares had great discrepancy among industries. The dairy industry was the only one trying to build up a better marketing network. Similar to the expansion on marketing channels, the direct sale was preferred by the frozen seafood, frozen fruit and vegetable, tea, fruit juice, soybean oil, and margarine industries. Industries with higher production costs and relatively limited markets comparing to their production capacity such as the soybean oil and peanut oil industries would consider foreign investment to expand markets and reduce average cost. Moreover, the advertisement and extension services were considered as crucial strategies for dairy, frozen prepared food, frozen meat, fruit juice, and food packaging industries.

As a result, the cost mark up and demand orientation were two most crucial pricing strategies adopted among food processing industries. Product quality, tastes, and reasonable prices were important product strategies for most firms. The trend toward creation of new products was under the way among these industries. The advertisement, extension services, and the expansion of marketing outlets were also very important strategies for many industries.

3.3 The Performance of Food Processing Industries

The available data showed that dairy industry had the highest profit rate among six industries (table 7). Only frozen prepared food industry had the profit rate lower than 10 percent. Other industries did not supply adequate profit information probably due to the consideration on business secret.

Labor productivity is defined as the total industrial sale's value divided by total numbers of industrial employment. Frozen prepared food, food packaging, and soybean oil in-

Table 7. Industrial Performance of Food Processing Industries in Taiwan, 1989.

Industry	Technical Progress						References
	Profit Rate	Labor Productivity	Capital Productivity	R & D	Technology Induction	Rate of Facility Utilization	
	(%) (a)	(1 000 NT)(b)	(%) (c)	(%) (d)	(%) (e)	(%) (e)	
(A) Dairy	19.50	2032	2.90	0.95	18.52	High	Wu 1990
(B) Frozen Food							
1. Prepared Food	8.50*	1159	13.45*	2.42*	NA	Low*	Young et. al. 1988 Shiu et. al. 1990
2. Seafood	NA	4175*	15.52*	Low*	NA	High*	Yuang 1988
3. Meat	NA	NA	NA	3.67*	NA	High*	Ho 1989
4. Fruit & Vegetable	NA	1279*	2.02*	NA	NA	NA	Wu et. al. 1989
(C) Fast Food	18.20	9	NA	NA	NA	NA	Lee and Chang 1990
(D) Tea**	10.80	1310	8.36	0.07	NA	NA	Shiu et. al. 1990
(E) Fruit Juice**	16.50	NA	NA	NA	NA	NA	Fu et. al. 1989
(F) Food packaging	15.00	3348	1.85	2.40	NA	High	Li et. al. 1990
(G) Edible fats & oil							
1. Soybean Oil	NA	3639	2.00	0.33	NA	Low	Shiu et. al. 1990
2. Peanut Oil	NA	NA	NA	Low**	NA	NA	Shiu et al. 1990
3. Sesame Oil	NA	NA	NA	0.203**	Low**	NA	Shiu et. al. 1990
4. Rice Bran Oil	NA	NA	NA	NA	NA	NA	Shiu et al. 1990
5. Margarine	NA	NA	NA	1.99**	NA	NA	Shiu et. al. 1990

Source : Various research reports of FIDRI in Taiwan, 1988-1990

* : 1987 data

** : 1988 data

NA: Not available

(a) : Profit rate index is represented by the percentage of the difference between sale's income and cost over sale's income

(b) : Average productivity of labor is obtained from dividing sale's value by numbers of employee.

(c) : Average productivity of capital is obtained from dividing sale's value by capital amount.

(d) : Calculated from the percentage of R & D expenses over total sale's value.

(e) : The rate of facility utilization is considered as high if the average rate is above 60% and low if below 60%.

industries showed very significant labor productivity. It is not surprising that the fast food industry had the lowest labor productivity from its need for intensive labor employment.

Capital productivity is defined as the total industrial sale's value over total invested capital. Again, the frozen seafood industry had the largest capital productivity implying a very efficient industry. The dairy, frozen fruit and vegetable, food packaging, and soybean oil industries exhibited very low capital productivity. Low capital productivity and high profit rate of the dairy and food packaging industries may imply highly value-added products.

The technical progress is another important indicator for the evaluation of industrial performance. The percentage of research and development (R&D) expenses over total industrial sale's value and the rate of facility utilization explain the technical progress. Most industries did not put much expenses on R&D mainly because of low scale economies. The frozen meat industry with large export market had the largest ratio of R&D expenses. The frozen prepared food, food packaging, and margarine industries with preference on advertisement and new products had some degree of expenses on R&D. Other industries showed very low expenses on R&D. Moreover, the dairy, frozen seafood, frozen meat, and food packaging industries had high rates of facility utilization while frozen prepared food and sesame oil industries exhibited low rates of facility utilization.

Several impressions can be concluded on the performance of food processing industries. Most industries had the profit rate over 10 percent. Frozen seafood industry had largest labor and capital productivity among the industries which implying a very efficient industry. For industry with large exports may need more expenses on research and development in order to meet international competition. Moreover, frozen prepared food industry may have more space for rapid growth to increase facility utilization.

3.4 Available Information of the Food Processing Industry

There are three periodicals published by FIDRI on the information related to food industry. Firstly, the semi-monthly Food Market Information provides current situation and issues of important food products as well as the general review. Secondly, the quarterly

Consumer Food News published in March, June, September, and December reports various important and special topics such as food nutrition, food safety, healthy food, and more are expressed and discussed. Thirdly, the yearly Special Edition of Food Market Review reviews past and current development on various important food industries as special reports. All the strategic food industries are reported with their future expectations and their comparison with those of foreign countries.

IV. Current Issues of Food Processing Industry in Taiwan

The changing consumption pattern particularly toward higher quality products, sanitary standards, healthy contents, time saving, safety package, and new varieties have created advantageous environment for the food processing industries in Taiwan. Most industries are trying to differentiate own brand-name products through intensive advertising and promotion as well as better labelling. The increasing market competition further request industries putting more efforts on research and development, operational efficiency, collecting market information, and vertical integration.

Among the industrial competition, several market characteristics can be classified for the explanation of important issues at hand. Firstly, industries such as frozen prepared food, frozen seafood, tea, fruit juice, etc. are turning export oriented production into domestic market expansion. The current important tasks are the development of new products and the improvement of technology, product quality, taste, outlets, market information, and package.

Secondly, the industries highly depend upon imported input materials such as the dairy, fruit juice, soybean oil, and food packaging are searching for stable supply and lower import tariffs. Cooperative import of inputs may be of feasible strategy to assure marketing order, control quality inputs, and raise profit margin. With the marketing order in mind, reasonable pricing is another task to cooperate among the industry in order to avoid distorted competition on outputs within the domestic market. For food packaging industry, the development of modern packaging products such as aluminum can, light glass bottle, and better pack-

aging materials for frozen food as well as microwave food is of great desire.

Thirdly, industries such as frozen meat, frozen fruit and vegetable, tea, and soybean oil are expecting the expansion of exports. The most important task for these industries are the development on more processed products for export market to retain added value inside the border. Since higher quality, sanitation, and packaging standards are needed for competitive advantage, careful inspection to receive quality inputs and the improvement on production technique are necessary. Moreover, the export strategy needs to be improved through the construction of foreign outlets and the collection of international information.

Forthly, industries such as soybean oil and peanut oil face limited domestic consumption market. The most important strategy to expand business has become the planning on parallel foreign investment and open foreign markets. However, most firms are staying at the planning stage which is highly influenced by limited information on foreign markets and regulations.

Fifthly, industries such as the sesame oil, rice bran oil, and margarine are facing problems on the improvement of production technique. These industries are strongly demanding the development of new products from the refinery of by-products and more skilled personnel in order to expand business. The small scale property prevailed in these industries further requires higher level of vertical integration.

Finally, the fast food industry is expanding rapidly with the increased eating away from home. The underlining change on consumption pattern is affected by the facts of increased per capita income, small-size family, and opportunity for women working outside. The most important task of this industry is to obtain agricultural products stably in quantity, quality, as well as price which needs more help from the government. The increasing international varieties further enhance the competitive situation which leads most firms to diversify products and catch alternative consumers. For the Chinese fast foods, the current task will be creating the fresh product image and elegant consumption environment.

To conclude the discussion on the current issues of food processing industries in Taiwan, several policy implications are apparent. Government regulations on food safety, sanitation, labelling, packaging, and fair competition are desired to develop orderly markets and consumers' confidence. The research and development investment needs to be promoted by

the industries as well as the government. Finally, the government should put more effort on constructing better market information system in order to meet with the rapid development of the food processing industries in Taiwan.

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臺灣食品加工產業現況與課題

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本文分析台灣食品加工業成長的客觀環境、產值和出進口變遷以及七項策略性產業之市場結構、行為和績效。各項產業組織指標整理自1988—1990年間，食品工業發展研究所和台灣大學、中興大學以及中央研究院編印之相關文獻。本文認為：個人所得成長、消費習性改變、總體經濟條件以及政策四項為支持國內食品加工業發展的重要因子。文內指陳加工食品業均具低度進入障礙和高成長潛力特性，並提供個別產業之集中度和垂直整合數據。

在廠商行為方面，定價策略大多以成本加成與需求引導為主，改善品質與迎合口味以及開發新產品為重要的產品策略，市場的擴張行為則隨產業別之不同而互有差異。產業績效方面，多數產業均有10%以上利潤率、高勞動生產力、低資本產出率以及研究開發投入不大等共同特性。當前課題包括六點：(1)由出口導向轉為進口導向產業應著重新產品研發以及品質、口味、銷售通路、市場資訊和包裝等之改善；(2)進口原料的產業應和國外廠商合作進口，以穩定成本與維持市場秩序；(3)出口擴張產業應開發更多樣化產品，尤應強化品質水準以及研擬有效的國外銷售方法；(4)油脂產業進行海外投資時，是否能擴大市場為主要關鍵；(5)部分油脂產業面臨技術提升和加強垂直整合之課題；(6)穩定加工原料來源與品質方面，政府政策性輔導和滿足消費者更多樣化選擇，均為各產業所擬著力重點。

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本文之數據資料主要參考「建立食品市場分析體系」研究計畫，民國七十八年和七十九年部份，該研究計畫之經費由行政院農業委員會補助。