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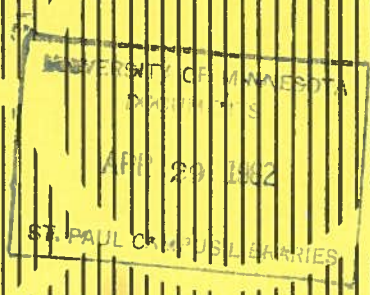
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Graph 11

February 1982

158-282

# MARKET STRUCTURE AND TECHNOLOGICAL PERFORMANCE IN THE FOOD MANUFACTURING INDUSTRIES



Agriculture Experiment Stations of Alaska, California, Cornell, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, Ohio, South Dakota and Wisconsin.

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## APPENDIX

# CLASSIFICATION OF PATENTS INTO VARIOUS PATENT CATEGORIES<sup>1</sup>

Patents for the 47 food-processing firms listed below were classified into six major groups: (a) food, (b) food process, (c) mechanical food process, (d) food processing indirect, (e) nonfood, and (f) food marketing. Not all the patents fit neatly into a single category. Overall, however, these groupings served well to delineate the purpose of the patents, though there were a good number of patents that could have fit well into either of two or three different groups.

Due to the breadth and generality of the classifications, some descriptions and examples will help clarify them. The first and easiest area in which to group patents was the "food" grouping. This class of patents consisted of edible ingredients, new foods, or old foods prepared to be marketed in a new form. Examples are: (a) ingredients—food thickeners, stabilizers, preservatives, flavorings, and colorings; (b) new foods—puffed cereals, low calorie foods, dessert toppings, snacks, and synthetic meats; (c) foods prepared in novel ways—quick-cooking rice, various dough compositions, instant puddings, and freeze-dried coffee. The category contained any product listed as a food by the firm, any substance that had a food use as well as nonfood uses (e.g., thickeners), and products, such as cheeses or sausages, that are patented for a given composition. Pet foods were also included in the food group if they were patented by a company, such as Ralston-Purina, that specializes in these types of nonhuman foods.

The next group consisted of "food processes." This group encompasses any patented procedure that was used for or directly related to the production of any food product or edible ingredient. This group did not include any processes that required the design or construction of special equipment, for these were classified as "mechanical food processes." Also not included were processes that were patented with a new food product because it was felt that the product was the object of the patent. This is an arbitrary decision but was followed to prevent double classifications. Several examples of patented food processes are: adaptations in grain milling, starch conversions, chemical alterations of food texture, making meat fibers, various preservative treatments, and nutritionally fortifying foods.

The third group of patents, "mechanical food processes," consists of any food process that required the patenting of a machine, component to a machine, any tool, or device that was instrumental to the production of any food product. The major concern here was the development and use of a device that had a function in the food industry. One could overgeneralize and include any conveyor, truck, forklift, scrub brush, lamp, or laboratory device that could find a use in the food field, but only those devices that had a direct application to the food industry were included. If a device such as a conveyor was patented with no specific purpose given, it was assumed that it could be used for a variety of purposes, and therefore was included as "nonfood." There were a number of devices omitted from this category because the patents made no mention of the specific purpose of the equipment.

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<sup>1</sup> Mike Lamagna, a student in Food Science, University of Wisconsin-Madison was primarily responsible for classifying these patents.

Examples of patents included in the classification of "mechanical food processes" are: packaging machines, food trimmers and peelers, animal-hide removers, slicers, quality-control and lab-testing devices, storage vessels, pumps, mixes, and labeling machines.

"Food processing—indirect" is the fourth class of patents and is a miscellaneous category for patents that were related to the food field but could not be properly placed in any of the three preceding classes. This "grab bag" consisted of by-product utilizations, offshoots of basic food processes, processes that were basically for biochemistry or chemical use but could find some limited application in the food industry, and some product- or reagent-recovery systems. Some specific examples in this area will demonstrate the range and composition of the classification. The meat industry has three prime examples: glue production from bones, use of various organs for hormone recovery, and a wide variety of uses for blood. The starch-refining companies utilize enzymes to degrade the starch, but an offshoot of this food process is the production and recovery of the enzymes used to hydrolyze the starch. The purification of proteins was also included here because it could find some application in the food industry, although it is more of a biochemical laboratory procedure.

The fifth category was "food marketing." This group was added to combine all the patents designed to help sell the product. Basically, this section contained patents dealing with display devices and a wide array of packages.

The final class is "nonfood." Although the companies studied were primarily food-producing companies, any patent that failed to show or state some use for the food industry was listed in this section. Since many major companies received numerous "nonfood" patents, the list of examples is plentiful: plastics, adhesives, detergents, resins, toys, hot air balloons, various chemicals, fertilizers, laundry starch, general-use machinery, skin lotions, home appliances, and motor fuels to name a few.

Over the 25 years covered in this study (1950-1974) a few trends and propensities of certain companies and industries were apparent. The proportion of patents produced in each of the six classes remained fairly constant over the 25 years, but there was a slight shift to developing more practical food-related patents.

In the "food" group there was considerable growth. During the 1950s these patents consisted of only about 5 percent of the total, but this category steadily grew to account for about 15 percent of all patents in the 1970s.

"Food processes" remained fairly stable during this time span, generally ranging from about 20 to 30 percent of the patents. The development of "mechanical food processes" also remained quite stable over the years, accounting for around 20 percent of the total. The patenting of "food marketing" devices also remained fairly steady, making up about 5 percent of the total throughout this span.

The category of "food processing—indirect" displayed the most noticeable decrease in importance. During the 1950s this group represented about 10 percent of the patents, but as of the 1970s, it consisted of only 1 percent of all patents.

"Nonfood" patents varied over the period, ranging from 28 percent to 44 percent of any year's patents, but in general they accounted for a substantial 35 percent of the patents received by these companies. One important fact about this class of patents is that most of these were developed by a handful of very large companies such as General Mills, Armour & Co., Borden, CPC, A.E. Staley,

and Swift & Co. These six companies probably made around 80 percent of all the patented "nonfood" innovations.

Most of the corporations in this study tended to concern themselves with developing patents that applied directly to the production of the foods specific to that company. This is best illustrated by examples of a few specific companies and their areas of development. Oscar Mayer is a prime example of a firm that concentrated its efforts on developing meat-packaging materials and packaging machinery. Gerber patented many conveyors and systems for handling food in glass jars, while the food canners generally limited themselves to devices to handle, clean, peel, and trim their raw products.

The patenting of "foods" and "food processes" was the main category of General Food's research-and-development effort, as it led nearly every year in these categories. The dairies, such as National Dairy Products and Pet Milk, were also oriented to the area of new foods and food processes.

The meat-packing houses are generally limited in developing new foods; therefore, companies like Swift and Armour were directing their main efforts toward better meat-handling machines and systems and by-product utilization. Brewers, also limited in new foods, turned to making systems to handle their products, e.g., cans and bottles.

Corn millers, such as CPC and A.E. Staley, were concerned with starches, corn syrups, and milling by-products used for animal feeds.

The wheat millers—Pillsbury, Quaker Oats, and General Mills—received patents in most categories. General Mills was noted for usually having over half of any given year's patents in the "nonfood" listing. This also applied to Quaker Oats. On the other hand, Pillsbury was generally oriented to developing foods, food processes, machinery for handling wheat and pastries, and containers for packaging its products.

The remaining industries, such as baking, soft drinks, sugar refining, distilling, and confections, produced very few patents over the 25 years covered, and when they did obtain their patents, their function was usually quite specific to the given company.

### Firms Used for Patent Classifications

A.E. Staley Manufacturing	Great Western Sugar	Savannah Sugar Refining
Amalgamated Sugar	Green Giant	(Savannah Foods & Industries)
American Bakeries	H. J. Heinz	Stokely-Van Camp
American Crystal Sugar	Hershey Chocolate (Hershey Foods)	Swift & Co. (Esmark)
American Maize-Products	Holly Sugar	United Biscuit Co. of American (United Biscuits)
American Sugar Refining (Amstar)	Hygrade Food Products	
Anheuser Bush	Interstate Bakeries (Interstate Brands)	
Armour & Co.	Kellogg	
Borden	Libby, McNeil & Libby	
Brown-Forman Distillers	National Biscuit (Nabisco)	
California Packing (Del Monte)	National Dairy Products (Kraftco)	
Campbell Soup	National Sugar Refining	
Carnation	Oscar Meyer	
Coca-Cola	Pabst Brewing	
Corn Products Refining (CPC International)	Pepsi Cola (Pepsi Co.)	
Cudahy Packing	Pet Milk	
Falstaff Brewing	Peter Paul	
General Foods	Pillsbury Mills (Pillsbury)	
General Mills	Quaker Oats	
Geo. A. Hormel	Ralston Purina	
Gerber Products	Rath Packing	
Godchaux Sugars		

**Appendix Table 1. Research-and-Development Expenditures and Intensities for Large Food-Manufacturing Firms, 1972-1977**

Company Name	R & D Expenditures (thousands)						R & D Expenditures as a Percent of total Sales					
	1972	1973	1974	1975	1976	1977	1972	1973	1974	1975	1976	1977
American Maize-Products Co.	\$ 647	\$ 524	\$ 548	\$ 625	\$ 500	\$ 900	0.49%	0.32%	0.25%	0.27%	0.19%	0.34%
Amstar Corp.	1,411	1,423	1,374	1,715	2,069	1,583	0.21	0.21	0.13	0.10	0.19	0.17
Anderson, Clayton & Co.	2,000	2,000	2,300	2,950	2,800	2,978	0.33	0.29	0.26	0.34	0.37	0.31
Anheuser-Busch Inc.	611	540	609	000	000	000	0.07	0.05	0.04	0.00	0.00	0.00
Archer-Daniels-Midland Co.	3,476	000	000	1,436	1,720	1,848	0.51	0.00	0.00	0.08	0.10	0.09
Barton's Candy Corp.	050	017	017	000	000	019	0.37	0.13	0.12	0.00	0.00	0.12
Borden, Inc.	9,394	9,912	11,831	13,629	14,763	16,300	0.42	0.39	0.36	0.40	0.44	0.47
Campbell Soup Co.	10,728	11,373	12,780	12,741	13,794	15,393	0.99	0.92	0.87	0.82	0.84	0.87
Campbell Taggart	430	522	546	578	664	757	0.12	0.11	0.09	0.09	0.10	0.10
Carnation Co.	4,600	4,800	5,600	6,600	7,300	9,500	0.36	0.33	0.30	0.32	0.34	0.41
Central Soya Co., Inc.	2,200	2,300	2,500	2,800	3,000	4,400	0.24	0.18	0.14	0.16	0.18	0.20
Coca-Cola Co.	7,476	7,633	6,702	6,862	9,200	11,110	0.40	0.36	0.27	0.23	0.30	0.31
Conagra, Inc.	323	452	678	555	546	622	0.11	0.11	0.11	0.10	0.11	0.12
Consolidated Foods Corp.	3,440	4,024	4,030	5,088	5,943	5,697	0.20	0.20	0.17	0.21	0.22	0.20
Adolph Coors Co.	4,296	4,923	6,062	7,270	7,039	7,711	1.30	1.30	1.30	1.40	1.19	1.30
CPC International Inc.	16,350	16,026	17,736	21,700	24,500	26,000	1.06	0.86	0.69	0.79	0.91	0.91
Del Monte Corp.	7,424	7,505	8,988	8,988	9,861	11,000	0.89	0.79	0.86	0.70	0.69	0.74
Esmark, Inc.	4,007	4,184	4,800	4,900	10,000	9,400	0.12	0.11	0.10	0.10	0.19	0.18
Fairmont Foods Co.	342	326	000	000	235	244	0.10	0.09	0.00	0.00	0.05	0.05
Flowers Industries Inc.	024	022	011	000	000	029	0.03	0.02	0.08	0.00	0.00	0.01
Foremost-McKesson, Inc.	1,311	1,369	1,456	1,447	1,750	2,000	0.07	0.07	0.07	0.06	0.07	0.07
General Foods Corp.	25,090	27,671	27,743	31,277	37,841	49,850	1.04	1.05	0.93	0.85	0.95	1.02
General Mills, Inc.	17,400	18,987	21,600	22,900	25,700	25,800	1.24	1.14	1.08	0.99	0.97	0.89
Gerber Products Co.	2,430	2,575	2,378	2,797	3,192	3,548	0.86	0.92	0.83	0.85	0.86	0.88
Great Western United Corp.	1,844	000	1,867	2,185	1,884	1,469	0.81	0.00	0.72	0.43	0.37	0.29
Green Giant Co.	1,005	1,900	2,133	2,200	2,123	2,600	0.36	0.65	0.66	0.62	0.54	0.61
Hershey Foods Corp.	1,422	1,861	1,586	2,008	2,229	2,686	0.34	0.42	0.31	0.35	0.39	0.40
Heublein, Inc.	3,128	5,401	6,387	6,700	7,522	6,906	0.34	0.53	0.50	0.46	0.46	0.46

*continued*

Company Name	R & D Expenditures (thousands)						R & D Expenditures as a Percent of total Sales					
	1972	1973	1974	1975	1976	1977	1972	1973	1974	1975	1976	1977
H.J. Heinz Co.	4,900	5,930	7,464	8,213	9,564	9,395	0.48	0.53	0.55	0.52	0.55	0.50
Geo. A. Hormel & Co.	1,037	1,010	1,273	1,585	1,589	2,036	0.14	0.12	0.14	0.16	0.15	0.18
Holly Sugar Corp.	555	681	787	1,758	1,630	1,194	0.59	0.68	0.71	0.64	0.74	0.67
International Multifoods Corp.	1,266	1,294	1,285	1,500	1,530	1,600	0.28	0.24	0.17	0.18	0.19	0.19
Kellogg Co.	4,714	4,379	4,829	5,232	7,468	7,700	0.67	0.53	0.48	0.42	0.54	0.50
Kraft, Inc.	8,500	8,950	9,875	10,850	13,000	16,000	0.27	0.25	0.22	0.22	0.26	0.31
Oscar Mayer & Co., Inc.	2,263	2,230	2,641	2,995	3,709	5,632	0.32	0.25	0.27	0.28	0.33	0.47
McCormick & Co., Inc.	757	879	1,041	1,179	1,380	1,720	0.47	0.47	0.47	0.47	0.45	0.48
Michigan Sugar Co.	013	012	000	000	000	009	1.05	0.04	0.00	0.00	0.00	0.02
Nabisco, Inc.	9,400	11,600	7,300	9,307	9,310	9,309	0.73	0.80	0.41	0.47	0.46	0.45
Norton Simon, Inc.	5,000	8,400	8,072	6,769	7,102	8,353	0.43	0.57	0.49	0.36	0.41	0.46
Pabst Brewing Co.	500	500	500	500	675	750	0.15	0.14	0.12	0.10	0.11	0.13
Peavey Co.	427	535	714	964	734	456	0.15	0.15	0.14	0.21	0.15	0.09
Pet, Inc.	703	749	860	1,000	1,000	1,000	0.10	0.10	0.10	0.10	0.10	0.09
Pillsbury Co.	5,500	6,100	6,600	7,400	10,300	14,300	0.77	0.75	0.66	0.62	0.72	0.98
Pittsburgh Brewing Co.	032	039	020	030	000	024	0.16	0.20	0.08	0.11	0.00	0.10
Quaker Oats Co.	10,800	13,994	15,358	16,864	18,964	19,300	1.40	1.41	1.25	1.21	1.29	1.24
Ralston Purina Co.	8,012	10,635	13,430	11,300	16,400	17,600	0.44	0.44	0.44	0.36	0.48	0.47
Joseph Schlitz Brewing Co.	1,400	1,340	1,500	1,750	1,700	1,750	0.23	0.19	0.18	0.19	0.17	0.19
J.M. Smucker Co.	173	226	199	274	281	303	0.25	0.29	0.22	0.25	0.25	0.25
A.E. Staley Manufacturing Co.	5,367	5,274	5,081	4,959	4,700	4,800	1.60	1.14	0.82	0.64	0.57	0.43
Standard Brands, Inc.	4,767	4,888	7,597	9,004	6,000	8,200	0.37	0.33	0.43	0.46	0.31	0.36
Topps Chewing Gum, Inc.	508	594	627	610	821	820	1.50	1.63	1.42	1.22	1.47	1.49
Tropicana Products, Inc.	307	315	414	250	561	629	0.29	0.26	0.31	0.15	0.27	0.26
U & I, Inc.	482	485	509	629	816	866	0.48	0.42	0.36	0.26	0.41	0.47
United Foods, Inc.	064	054	101	016	013	054	0.08	0.06	0.11	0.02	0.01	0.06
Universal Foods Corp.	751	827	1,070	1,340	1,612	1,618	0.80	0.78	0.80	0.86	0.94	0.84
Valmac Industries, Inc.	198	189	106	095	100	195	0.27	0.20	0.11	0.10	0.07	0.15
Ward Foods, Inc.	672	000	000	000	000	130	0.19	0.00	0.00	0.00	0.00	0.04
W.M. Wrigley Jr. Co.	600	900	1,064	1,611	1,963	1,651	0.29	0.39	0.39	0.47	0.53	0.41

Source: Securities and Exchange Commission, Form 10-K Reports of companies for various years.

\*Data include spending for quality control.

**Appendix Table 2. Patents Granted U.S. and Foreign Corporations, Individuals, and Governments in Selected Patent Categories in Six Food-Manufacturing Industries, 1963-1977.**

Industry	Origin	Number of Patents				Total
		1963-1965	1966-1969	1970-1973	1974-1977	
Poultry	United States	53	50	94	41	238
	Foreign	<u>1</u>	<u>5</u>	<u>13</u>	<u>16</u>	<u>35</u>
	Total	54	55	107	57	273
Dairy	United States	30	26	36	25	117
	Foreign	<u>17</u>	<u>23</u>	<u>31</u>	<u>31</u>	<u>102</u>
	Total	47	49	67	56	219
Meat	United States	229	296	320	231	1,076
	Foreign	<u>35</u>	<u>49</u>	<u>69</u>	<u>89</u>	<u>242</u>
	Total	264	345	389	320	1,318
Sugar	United States	12	21	36	18	87
	Foreign	<u>13</u>	<u>26</u>	<u>38</u>	<u>43</u>	<u>120</u>
	Total	25	47	74	61	207
Beer	United States	9	17	23	18	67
	Foreign	<u>18</u>	<u>27</u>	<u>28</u>	<u>21</u>	<u>94</u>
	Total	27	44	51	39	161
Starch	United States	15	8	7	4	34
	Foreign	<u>3</u>	<u>10</u>	<u>6</u>	<u>1</u>	<u>20</u>
	Total	18	18	13	5	54
Total	United States	348	418	516	337	1,619
	Foreign	<u>87</u>	<u>140</u>	<u>185</u>	<u>201</u>	<u>613</u>
	Total	435	558	701	538	2,232

Source: U.S. Patent and Trademark Office, Office of Technology Assessment and Forecast, special tabulation for the USPTO classes reported in the text for the beer, meat, poultry, dairy, sugar, and starch industries.



**Appendix Table 3. Total U.S. Patents Granted for Six Food-Manufacturing Industries by Origin of Recipient, 1963-1977**

	1963-1967	1968-1972	1973-1977	Total
Total	721	804	707	2232
<u>U.S. Origin</u>	563	594	462	1619
Corporate owner	350	395	319	1064
Government owned	1	9	1	11
Individually owned	212	190	142	544
<u>Foreign Origin</u>	158	210	245	613
Corporate owned	108	148	169	425
Government owned	0	2	4	6
Individually owned	50	60	72	182
<u>Foreign Origin</u>				
Germany	51	50	83	184
France	15	37	28	80
Netherlands	6	19	34	59
Canada	16	27	13	56
United Kingdom	20	12	14	46
Sweden	11	10	11	32
Denmark	8	10	8	26
Australia	6	6	7	19
Japan	1	7	10	18
Switzerland	6	7	5	18
Italy	4	2	7	13
Belgium	0	3	4	7
Czechoslovakia	3	4	0	7
Norway	2	2	2	6
USSR	0	2	4	6
Finland	0	1	4	5
Argentina	3	0	1	4
New Zealand	0	0	4	4
Romania	0	4	0	4
Mexico	1	2	0	3
Spain	0	1	2	3
Ireland	0	1	1	2
South Africa	0	1	1	2
Austria	1	0	0	1
Costa Rica	0	0	1	1
Egypt	1	0	0	1
Guatemala	0	0	1	1
Hungary	0	1	0	1
Iran	1	0	0	1
Israel	0	1	0	1
Peru	1	0	0	1
Turkey	1	0	0	1

Source: Same as Appendix Table 2.

**Appendix Table 4. Origin of Patents by Industry, 1969-1977**

	Industry						Total
	Beer	Meat	Poultry	Dairy	Sugar	Starch	
<u>Total patents</u>	104	792	183	139	153	28	1,399
U.S. firms within the industry	7	84	23	11	9	8	142
U.S. firms outside the industry	18	340	85	39	32	4	518
a) Other food manufacturers	4	23	1	2	4	0	34
b) Food-machinery firms	3	144	73	28	5	2	255
c) Other firms	11	173	11	9	23	2	229
Foreign corporations	36	103	21	51	80	6	297
Individuals	42	257	51	35	32	9	426
U.S.	20	200	41	19	21	1	302
Foreign	22	57	10	16	11	8	124
Government	1	8	3	3	0	1	16
U.S.	0	4	3	2	0	1	10
Foreign	1	4	0	1	0	0	6

Source: U.S. Patent and Trademark Office, Office of Technology Assessment and Forecast, special tabulation for the USPTO classes reported in the test for the beer, meat, poultry, dairy, sugar and starch industries.

**Appendix Table 5. U.S. Patents Granted for Each of Six Food-Manufacturing Industries, by Nation of Recipient, 1963-1977**

	Sugar Refining	Brewing	Poultry Processing	Dairy Processing	Meat Packing	Starch Mfg.	Total
<u>Total</u>	207	161	273	219	1,318	54	2,232
<u>U.S. Origin</u>	87	67	238	117	1,076	34	1,619
Corporate owned	60	38	156	80	699	31	1,064
Government owned	0	0	3	2	6	1	12
Individually owned	27	29	79	35	371	2	543
<u>Foreign Origin</u>	120	94	35	102	242	20	613
Corporate owned	103	59	23	82	147	11	425
Government owned	0	1	0	1	4	0	6
Individually owned	17	34	12	19	91	9	182
<u>Foreign Origin</u>							
Argentina	1	0	0	0	3	0	4
Australia	4	1	0	7	7	0	19
Austria	0	0	0	0	1	0	1
Belgium	6	0	0	0	1	0	7
Canada	7	12	4	2	29	2	56
Costa Rica	1	0	0	0	0	0	1
Czechoslovakia	1	1	0	0	5	0	7
Denmark	6	0	2	3	15	0	26
Egypt	1	0	0	0	0	0	1
Finland	2	0	0	3	0	0	5
France	18	11	1	22	28	0	80
Germany	46	35	0	15	82	6	184
Guatemala	0	0	0	0	1	0	1
Hungary	0	1	0	0	0	0	1
Iran	1	0	0	0	0	0	1
Ireland	0	1	0	1	0	0	2
Israel	1	0	0	0	0	0	1
Italy	3	4	0	1	5	0	13
Japan	3	5	0	1	8	1	18
Mexico	0	0	0	0	1	2	3
Netherlands	4	0	24	15	12	4	59
New Zealand	0	0	0	4	0	0	4
Norway	0	0	0	2	4	0	6
Peru	1	0	0	0	0	0	1
Romania	1	0	0	3	0	0	4
South Africa	2	0	0	0	0	0	2
Spain	0	0	0	1	2	0	3
Sweden	2	1	1	11	13	4	32
Switzerland	3	3	0	6	5	1	18
Turkey	1	0	0	0	0	0	1
United Kingdom	5	18	3	4	16	0	46
U.S.S.R.	0	1	0	1	4	0	6

Source: Same as Appendix Table 2.

**Appendix Table 6. Number of Foreign and Domestic Patents Applied for or Received by Putman Award Recipients by Award Categories, 1971-1977<sup>a</sup>**

Award Category	Number of Awards <sup>a</sup>	Number with Patent Information Available	Percent <sup>b</sup> Patented	Percent <sup>b</sup> Patented, Domestic	Percent <sup>c</sup> Patented, Foreign	Foreign as a % of Domestic
<b>Category I</b>						
Processing equipment & machinery	52	14	71	71	43	61
Processing systems	24	8	63	50	50	100
Process control & laboratory instrumentation	30	16	50	44	38	86
Packaging and packaging machinery	<u>42</u>	<u>15</u>	<u>60</u>	<u>50</u>	<u>47</u>	<u>78</u>
Subtotal	148	53	60	57	46	77
<b>Category II</b>						
Food-plant maintenance & engineering	14	6	67	67	67	100
Food-plant construction	9	2	50	50	50	100
Cleaning/Sanitation	<u>19</u>	<u>5</u>	<u>60</u>	<u>60</u>	<u>40</u>	<u>67</u>
Subtotal	42	13	62	62	54	88
<b>Category III</b>						
Materials handling & distribution	26	13	85	85	69	81
<b>Category IV</b>						
Ingredients	27	13	69	69	54	78
<b>Category V</b>						
Industry development	3	2	100	100	50	50
<b>Total</b>	<b>246</b>	<b>94</b>	<b>66</b>	<b>64</b>	<b>50</b>	<b>78</b>

<sup>a</sup>This table reflects the number of awards granted during 1971-1977. Awards with more than one winner have been counted only once.

<sup>b</sup>Percent of number of awards with patent information available.

<sup>c</sup>Includes two awards which have a foreign patent only.

**Appendix Table 7. Number of Putman Award Recipients During 1971-1977 Acquired Since 1950**

Acquired Firm's Primary Line of Business	Number of Firms Acquired Prior to Receiving Awards	Number of Firms Acquired After Receiving Awards	Total
Food processor, ingredient manufacture	6	5	11
Packaging & paper	2	2	4
Chemicals & paints	0	2	2
Instrument & controls manufacturer	2	3	5
Plant maintenance, sanitation & design	7	3	10
Machinery Manufacturers	9	6	15
Other <sup>b</sup>	<u>2</u>	<u>1</u>	<u>3</u>
<b>Total</b>	<b>28</b>	<b>22<sup>a</sup></b>	<b>50</b>

Note: Total number of companies in sample is 204. The 50 acquired firms account for 73 of 265 awards or 28 percent.

<sup>a</sup> Four acquired companies received awards after being acquired during 1971-1975.

<sup>b</sup> The other category includes a railroad-car leasing company, a conglomerate, and a fiberglass manufacturer.