



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# Staff Papers Series

P81-7

March 1981

ECONOMIC IMPORTANCE OF AGRICULTURE-RELATED INDUSTRY IN MINNESOTA

Wilbur R. Maki, Peter L. Stenberg and Mason Chen

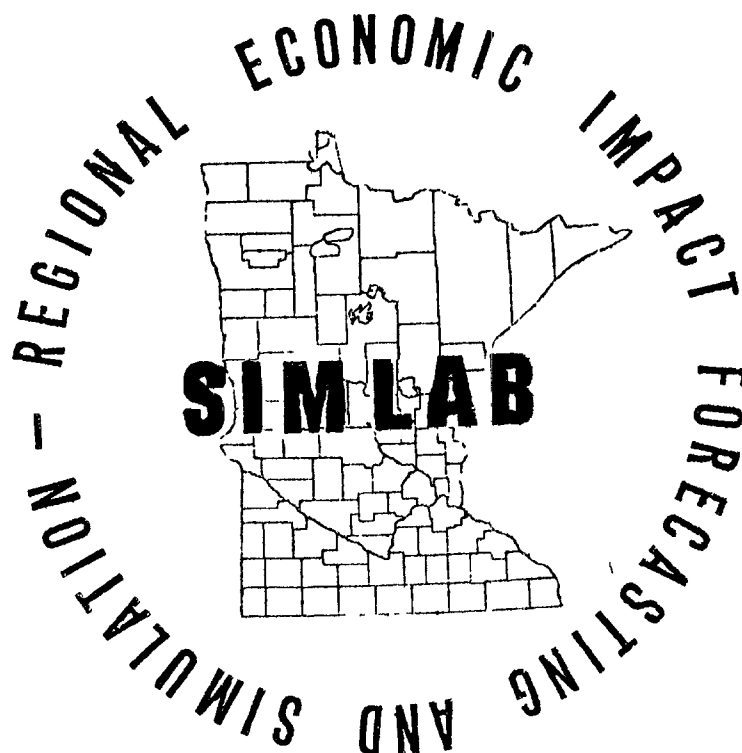


**Department of Agricultural and Applied Economics**

University of Minnesota  
Institute of Agriculture, Forestry and Home Economics  
St. Paul, Minnesota 55108

ECONOMIC IMPORTANCE OF AGRICULTURE-RELATED INDUSTRY IN MINNESOTA

Wilbur R. Maki, Peter L. Stenberg and Mason Chen



REIFS Report No. 15

Staff papers are published without formal review within the Department of Agricultural and Applied Economics.

## CONTENTS

	<u>Page</u>
Acknowledgements	i
Abstract	i
Summary and Conclusions	ii
Introduction	1
Study objectives	1
Study approach	2
Economic Indicators	7
Industry sales and income payments	7
Employment and earnings	9
Personal income	12
Industry Purchases and Sales	12
Livestock and crop agriculture	18
Food products manufacturing	21
Interregional Trade	23
Livestock and crop agriculture	23
Food products manufacturing	29
Gross State Product	31
Value added	31
Final product	32
References Cited	36

### Acknowledgements

Financial support of the Minnesota Agricultural Experiment Station is acknowledged. A special grant has made possible an updating and expansion of the 1970 Minnesota input-output computer model for use in studies of agriculture and related industries in Minnesota's economic growth and development.

### Abstract

This report is the third in a series on interindustry and interregional relationships and their implications for the economy of Minnesota and its substate development regions. In this report, the role and importance of agriculture-related industries in Minnesota are discussed. A total of 19 agriculture and 35 food products manufacturing industries are identified as the principal agriculture-related industries in the state and the nation. Their interindustry and interregional (Minnesota and rest-of-nation) linkages are derived for the 1977 calendar year. Results are presented in constant 1972 dollars for comparison with other reports in this series.

## Summary and Conclusions

Economic importance of agriculture-related industry is measured in industry sales and purchases, income and jobs. Sales, especially exports of farm and food products to rest-of-nation and world markets, are large compared with all industry sales. Forty-one percent of all Minnesota industry exports originated in the agriculture and food products manufacturing industries in 1977. In-state purchases of production inputs were nearly as large -- 33 percent of the total. In jobs and income, however, agriculture's importance is much less. In 1977, the two agriculture-related industry groups accounted for 11 percent of all jobs and 12 percent of all value added by Minnesota industry, including government. The percentage distributions for the two industry groups and all other industry were as follows:

<u>Industry Group</u>	<u>Export Sales</u>	<u>In-State Purchases</u> (pct.)	<u>Value Added</u>	<u>Jobs</u>
Agriuculture	7.8	11.2	8.2	8.5
Food Products	33.6	22.0	4.1	2.6
All Other	58.6	66.8	87.7	88.9

Detailed tabulations of industry purchases and sales presented in this report show the industry sources and the industry destinations of agriculture-related exports and imports. These tabulations are based on a 214-industry breakdown of the 1977 Minnesota economy. They are presented in 1972 dollars for comparison with corresponding 1972 industry sales and purchases presented in an earlier report in this series.

Simple numerical comparisons between the industry groups for the 1972-1977 period show percentage increases in the sales, purchases and value added as follows:

<u>Industry Group</u>	<u>Total Sales</u>	<u>Export Sales</u>	<u>In-State Purchases</u> (pct.)	<u>Value Added</u>
Agriculture	18.3	18.8	26.3	33.4
Food Products	24.1	24.7	28.2	33.2
All Other	15.7	1.2	18.0	18.1

Of the three industry groups, the largest increases were estimated in food products manufacturing, particularly in export sales and value added. Total sales are included, also, for comparison with export sales, which dropped sharply, in constant dollar value, for the "all other" industry group.

Later studies in this report will provide a further updating of the data base and, also, new demand and supply multiplier series based on the latest 1977 input-output tables. This report documents the transition from the 1972 to the 1977 Minnesota interindustry data series and analyses. The later studies will start with the 1977 input-output tables in current dollars in their individual industry assessments.





ECONOMIC IMPORTANCE OF AGRICULTURE-RELATED  
INDUSTRY IN MINNESOTA

by

Wilbur R. Maki, Peter L. Stenberg and Mason Chen

Agriculture-related industry is confined, in this report, to livestock and crop agriculture and related services, and food products manufacturing. This industry cluster has been characterized as declining in total employment and, also, in its share of total state income (3,4). In total sales, however, particularly out-of-state shipments, the agricultural and food products manufacturing industries account for a large share -- 20 to 40 percent -- of total state activity (7).

An emphasis on the sales and, also, the purchases of agriculture-related industry shifts an assessment of its economic importance from immediate and direct employment effects to long-term and total effects on state and substate economic growth and development. In this approach, access to a detailed and up-to-date interindustry transactions table of the Minnesota economy is essential. For this report, a new 1977 input-output table of intermediate and final purchases from 214 industries in the state was used to identify agriculture-related linkages with individual industries, both in Minnesota and in rest of nation.

Study objectives

Primary purpose of this report is the presentation of recent study findings on the extent and nature of interindustry linkages in the Minnesota economy and the implications of these linkages for state economic growth and development. Agriculture-related industry is emphasized because of its changing economic role, which is due, in part, to the growing importance of non-

agricultural manufacturing, trade and service industries in employment, income and sales. In this report, agriculture-related industry is examined with respect to its role as a basic industry and as a market for other industries.

Specific study objectives were (1) to prepare a 1977 Minnesota input-output table emphasizing agriculture-related industry, (2) to derive the conventional input-output coefficients for assessing industry-specific effects of agriculture-related industry, and (3) to assess the economic importance of agriculture as measured by the level and distribution of agriculture-related sales and purchases. This report has some findings relating to the first two objectives. Its major emphasis, however, is the last objective, namely, the assessment of agriculture's importance to other industries and to the state.

#### Study approach

Preparation of the 1977 Minnesota input-output tables and related coefficients was based on data and procedures discussed earlier in the Regional Economic Impact Forecasting and Simulation (REIFS) Report Series (1, 2, 5, 6). A 1977 U.S. input-output table was prepared, first, by using the 1972 U.S. input-output structure and the 1977 U.S. final demands to "forecast" 1977 U.S. industry outputs and interindustry transactions. The Minnesota TRIO Computer Model was used, subsequently, to derive tables of corresponding industry outputs and interindustry transactions for Minnesota. Sales and purchases for a total of 214 industries, eight final demand sectors, and a value added sector were estimated.

Industries identified for this study include a large proportion of agriculture-related industries, as shown in Table 1.1. Each of 214 industries represent individual industries and groups of two or more industries in the detailed data base for the 1972 U.S. input-output tables (8). Comparable

Table 1.1. Relation of Minnesota 214-Industry Code to Selected Minnesota and U.S. Industry Codes Based on Standard Classification System.

Minnesota 214-Industry Code No. Title	BLS 154- Ind.	USDC 496- Ind.	Minnesota		SIC Code (1972 edition)
			55- Ind.	95- Ind.	
1. Dairy farm prod.	pt.1	1.01	pt.1	p 1	0241,pt.0191,pt.0259,pt.0291
2. Poultry and eggs	pt.1	1.02	pt.1	pt.1	025(exc. 0254 & pt.0259) pt.0191,pt.0219,pt.0291
3. Meat animals	pt.2	1.0301	pt.1	pt.1	021(exc.pt.0219),pt.0191, pt.0259,pt.0291
4. Misc. livestock	pt.2	1.0302	pt.1	pt.1	027,pt.0191,pt.0219,pt.0259, pt.0291
5. Cotton	3	2.01	pt.2	pt.2	0131,pt.0191,pt.0219,pt.0259, pt.0291
6. Food grains	pt.4	2.0201	pt.2	pt.2	pt.011,pt.0191,pt.0219, pt.0259,pt.0291
7. Feed grains	pt.4	2.0202	pt.2	pt.2	pt.011,pt.0139,pt.0191, pt.0219,pt.0259,pt.0291
8. Grass seed	pt.5	2.0203	pt.2	pt.2	pt.0139,pt.0191,pt.0219, pt.0259,pt.0291
9. Tobacco	pt.5	2.03	pt.2	pt.2	0132,pt.0191,pt.0219, pt.0259,pt.0291
10. Fruits	pt.5	2.0401	pt.2	pt.2	pt.017,pt.0191,pt.0219, pt.0259,pt.0291
11. Tree nuts	pt.5	2.0402	pt.2	pt.2	0173,pt.0179,pt.0191,pt.0219, pt.0259,pt.0291
12. Vegetables	pt.5	2.0501	pt.2	pt.2	0134,0161,pt.0119,pt.0139, pt.0191,pt.0219,pt.0259, pt.0291
13. Sugar crops	pt.5	2.0502	pt.2	pt.2	0133,pt.0191,pt.0219,pt.0259, pt.0291
14. Misc. crops	pt.5	2.0503	pt.2	pt.2	pt.0119,pt.0139,pt.0191, pt.0219,pt.0259,pt.0291
15. Oil-bearing crops	pt.5	2.0600	pt.2	pt.2	0116,pt.0119,pt.013,pt.0173, pt.0219,pt.0259,pt.0291
16. Forest products	pt.5	2.0701	pt.2	pt.2	pt.018,pt.0191,pt.0219, pt.0259,pt.0291
17. Greenhouse & misc. products	pt.5	2.0702	pt.2	pt.2	pt.018,pt.0191,pt.0219, pt.0259,pt.0291
18. Forestry & fishery prod.	6	3.00	pt.3	3	081-4,091,097
19. Agr.,for., & fishery serv.	7	4.00	pt.3	4	0254,07(exc.074),085,092
20. Iron & Qres	8	5.00	4	5	101,106
21. Copper ore mining	9	6.01	6	pt.6	102
22. Other nonferrous ores	10	6.02	5	pt.6	103-105,pt.108,109
23. Coal mining	11	7.00	pt.7	7	1111,pt.1112,1211,pt.1213
24. Oil and gas extraction	12	8.00	pt.7	8	131,132,pt.138
25. Stone & clay manuf. & quarrying	13	9.00	pt.7	9	141-145,pt.148,149
26. Chem. & fert.,mining	14	10.00	pt 7	10	147
27. New residential build. constru.	15	11.01	pt.8	pt.11	pt.15,pt.16,pt.17
28. New nonres. build. constr.	16	11.02	pt.8	pt.11	pt.15, pt.16, pt.17
29. New public utility constr.	17	11.03	pt.8	pt.11	pt.16, pt.17
30. New highway construction	18	11.04	pt.8	pt.11	pt.16, pt.17
31. All other construction	19	11.0501- .0502,.0505	pt.8	pt.11	pt.15,pt.16,pt.17
32. Well drilling, mineral explor.	20	11.0503- .0504,.0506, .0508	pt.8	pt.11	pt.138,pt.108,pt.1112,pt.121
33. Maint. & repair construction	21	12.0100- .0216	pt.8	12	pt.15,pt.16,pt.17
34. Complete guided missiles	22	13.01	pt.9	pt.13	3761
35. Other ordinance	22	13.02-07	pt.9	pt.13	348,3795
36. Meat packing plants	pt.24	14.0101	pt.11	pt.15	2011
37. Sausages & other prepared meats	pt.24	14.0102	pt.11	pt.15	2013
38. Poultry dressing plants	pt.24	14.0103	pt 11	pt 15	2016
39. Poultry and egg processing	pt.24	14.0104	pt.11	pt.15	2017
40. Creamery butter	pt.25	14.02	pt.10	pt.14	2021
41. Cheese,natural & processed	pt.25	14.03	pt.10	pt.14	2022
42. Condensed & evaporated milk	pt.25	14.04	pt.10	pt.14	2023
43. Ice cream & frozen desserts	pt.25	14.05	pt.10	pt.14	2024
44. Fluid milk	pt.25	14.06	pt 10	pt.14	2026
45. Canned fruits & veg.	pt.26	14.09	pt.10	pt.14	2033
46. Frozen fruits & vegetables	pt.26	14.13	pt.10	pt.14	2037, 8
47. Other preserved fruits & veg.	pt.26	14 07, 8,10-12	pt 10	pt.14	2032,2034,2035

Table 1.1. Relation of Minnesota 214-Industry Code to Selected Minnesota and U.S. Industry Codes Based on Standard Classification System (continued).

Minnesota 214-Industry Code No. Title	BLS 154- Ind.	USDC 496- Ind.	Minnesota		SIC Code (1972 Edition)
			55- Ind.	95- Ind.	
48. Flour & other grain mill prod.	pt.27	14.1401	pt.12	pt.16	2041
49. Cereal preparations	pt.27	14.1402	pt.12	pt.16	2043
50. Blended and prepared flour	pt.27	14.1403	pt.12	pt.16	2045
51. Dog, cat & other pet foods	pt.27	14.1501	pt.12	pt.16	2047
52. Prepared feeds, n.e.c.	pt.27	14.1502	pt.12	pt.16	2048
53. Rice milling	pt.27	14.16	pt.12	pt.16	2044
54. Wet corn milling	pt.27	14.17	pt.12	pt.16	2046
55. Bread, cake, & related prod.	pt.28	14.1801	pt.10	pt.14	2051
56. Cookies & crackers	pt.28	14.1802	pt.10	pt.14	2052
57. Sugar	29	14.19	pt.13	pt.14	2061-3
58. Confectionary & related prod.	30	14.20	pt.10	pt.14	2065-7
59. Malt liquors	pt.31	14.2101	pt.13	pt.17	2082
60. Malt	pt.31	14.2102	pt.13	pt.17	2083
61. Wines & distilled liquors	pt.31	14.2103,4	pt.13	pt.17	2084,5
62. Soft drinks, flavoring extracts	pt.32	14.22	pt.10	pt.14	2086
63. Flavoring extracts & syrups	pt.32	14.23	pt.13	pt.17	2087
64. Cottonseed oil mills	pt.33	14.24	pt.10	pt.14	2074
65. Soybean & veg. oil mills	pt.33	14.25, 14.26	pt.10	pt.14	2075,6
66. Animal & marine fats & oils	pt.33	14.27	pt.10	pt.14	2077
67. Roasted coffee	pt.33	14.28	pt.10	pt.14	2095
68. Shortening & cooking oils	pt.33	14.29	pt.10	pt.14	2079
69. Macaroni & spaghetti	pt.33	14.31	pt.10	pt.14	2098
70. Mfgd. ice & food prep. n.e.c.	pt.33	14.30, 14.32	pt.10	pt.14	2097,2059
71. Tobacco manufacturers	34	15.01-02	pt.13	18	21
72. Fabric & thread mills	35	16.01-04	pt.14	19	221-224,226,228
73. Floor coverings	36	17.01	pt.14	pt.20	227
74. Misc. textile prod.	37	17.02-10	pt.14	pt.20	229
75. Hosiery & knit goods	38	18.0101- .300	pt.14	p5.21	225
76. Apparel mfg.	39	18.04	pt.14	pt.21	23 (exc. 239), 39996
77. Fabricated textiles	40	19.01- 0306	pt.14	22	239
78. Logging	41	20.01	pt.15	pt.23	241
79. Sawmills & planing mills	pt.42	20.02	pt.15	pt.23	2421
80. Hardwood flooring	pt.42	20.03	pt.16	pt.23	2426
81. Special product sawmills	pt.42	20.04	pt.16	pt.23	2429
82. Millwork & cabinets	pt.43	20.05	pt.16	pt.23	2431,4
83. Veneer & plywood	pt.43	20.06	pt.16	pt.23	2435,6
84. Other wood prod.	pt.43	20.07-09	pt.15	pt.23	2439,2452,2448,249
85. Wood containers	44	21.00	pt.16	24	2441,9
86. Wood household furniture	pt.45	22.01	pt.16	pt.25	2511,2517,2519
87. Other household furn.	pt.45	22.02-.04	pt.16	pt.25	2512,2514,2515
88. Wood office furn.	pt.46	23.01	pt.16	pt.26	2521
89. Other furn. & fixtures	pt.46	23.02-.07	pt.16	pt.26	2522,2531,254,259
90. Pulp mills	pt.47	24.01	pt.17	pt.27	261
91. Paper mills	pt.47	24.02	pt.17	pt.27	262
92. Paperboard mills	pt.47	24.03	pt.17	pt.27	263
93. Other paper prod.	pt.47	24.04-.07	pt.17	pt.27	264,266
94. Paperboard containers	48	25.00	pt.17	28	265
95. Newspaper printing & pub.	49	26.01	pt.18	pt.29	271
96. Periodical & book pr. & pub.	50	26.02-.04	pt.18	pt.29	272-274
97. Misc. printing & publishing	51	26.05-08	pt.18	pt.29,30	275-279
98. Industrial inorg. & org. chem.	52	27.01	pt.19	pt.31	281 (exc. 28195), 2865,2867
99. Agricultural chemicals	53	27.02-.03	pt.19	pt.31	287
100. Misc. chemical prod.	54	27.04	pt.19	pt.32	2861,289
101. Plastic & rubber	55	28.01,.02	pt.19	pt.32	2821,2822
102. Synthetic fibers	56	28.03-.04	pt.19	pt.32	2823,2824
103. Drugs	57	29.01	pt.19	pt.33	283
104. Cleaning & toilet prep.	58	29.02-.03	pt.29	pt.33	284
105. Paints	59	30.00	pt.19	pt.32	285
106. Petroleum refining	pt.60	31.01	pt.20	pt.32	291,299
107. Paving & asphalt mix.	pt.60	31.02,3	pt.20	pt.34	295
108. Tires & inner tubes	61	32.01	pt.21	pt.37	301
109. Misc. rubber prod.	62	32.02,3,5	pt.21	pt.37	302-306
110. Plastic products	63	32.04	pt.21	pt.37	307
111. Leather tanning & ind. leather	64	33.01	pt.21	38	311
112. Footwear & other leather prod.	65	34.01- .0305	pt.21	39	313-319

Table 1.1. Relation of Minnesota 214-Industry Code to Selected Minnesota and U.S. Industry Codes Based on Standard Classification System (continued).

MN 214-Industry Code No. Title	BLS 154- Ind.	USDC 496- Ind.	Minnesota		SIC Code (1972 edition)
			55- Ind.	95- Ind.	
114. Hydraulic cement	pt.67	36 01	pt.22	pt.41	324
115. Brick & clay tile	pt.68	36 02	pt.22	pt.41	3251
116. Other struct. clay prod	pt.68	36.03-.05	pt.22	pt.41	3253,3255,3259
117. Pottery & rel. prod	69	36.06-.09	pt.22	pt.41	326
118. Concrete block & brick	pt.67	36.10-	pt.22	pt.41	3271-3
119. Lime & gypsum prod.	pt.67	36.13,14	pt.22	pt.41	3274,3275
120. Misc. stone & clay prod.	70	36.15-22	pt.22	pt.41	328,329
121. Basic steel prod.	71	37.01-	pt.23	pt.42	331
		.0105			
122. Primary ferrous metal prod.	72	37.02-.04	pt.23	pt.42	332,339,3462
123. Primary copper & copper prod.	73	38.01,.07	pt.24	pt.43	3331,3351,3357,3362
		.10,.12			
124. Prim. alum. & alum. prod.	74	38.04,	pt.25	pt.43	3334,3353-5,3361,28195
		.08,.11			
125. Other prim. nonferr. ores proc.	75	38.02,03,	pt.25	pt.43	3332,3333,3339,334,3356,
		.05,06,.09,			3369,3463
		.13,.14			
126. Metal containers	76	39.01-02	pt.26	44	341
127. Heating & plumb. fix.	77	40.01-03	pt.26	pt.45	343
128. Fabricated metal	78	40.03-09	pt.26	pt.45	344
129. Screw machine prod.	79	41.01	pt.26	pt.46	345
130. Metal stampings	80	41.02	pt.26	pt.46	3465,6,9
131. Cutlery hardwares & gen. hdw.	81	42.01-03	pt.26	pt.47	342
132. Other fabricated metal	82	42.04-11	pt.26	pt.47	347,349
133. Engines	83	43.01	pt.27	48	351
134. Farm machinery	84	44.00	pt.27	49	352
135. Construction & mining mach.	85	45.01-03	pt.27	50	3531-3533
136. Materials handling mach.	86	46.01-04	pt.27	51	3534-3537
137. Metalworking machinery	87	47.01-04	pt.27	52	354
138. Special ind. machinery	88	48.01-06	pt.27	53	355
139. Gen. industrail mach.	89	49.01-07	pt.27	54	356
140. Machine shops	90	50.00	pt.27	55	359
141. Electronic computing equip.	pt.91	51.0101	pt.27	pt.57	3573
142. Calculating & acctg. machines	pt.91	51.0102	pt.27	pt.57	3574
143. Office machines	92	51.02-04	pt.27	56	3572,3576,3579
144. Service industry machines	93	52.01-05	pt.27	58	358
145. Electrical transmission equip.	94	53.01-03	pt.28	pt.59	361,3825
146. Electrical industrial appar.	95	53.04-08	pt.28	pt.59	362
147. Household appliances	96	54.01-07	pt.28	60	363
148. Electric lighting	97	55.01-03	pt.28	61	364
149. Radio & TV sets	98	56.01-02	pt.28	pt.62	365
150. Telephone & telegraph equip.	99	56.03	pt.28	pt.62	3661
151. Radio & communication equip.	100	56.04	pt.28	pt.62	3662
152. Electron tubes	pt.101	57.01	pt.28	pt.63	3671-3
153. Semiconductors	pt.101	57.02	pt.28	pt.63	3674
154. Other electronic comp.	pt.101	57.03	pt.28	pt.63	3675-9
155. Misc. electrical equip.	102	58.01-05	pt.28	64	369
156. Motor vehicles	103	59.01-03	29	65	371
157. Aircraft	104	60.01-04	30	66	372,3764,3769
158. Boat building	105	61.01-02	pt.31	pt.67	373
159. Railroad equipment	106	61.03	pt.31	pt.67	374
160. Motor cycles	107	61.05	pt.31	pt.67	375
161. Other transp. equip.	108	61.06-07	pt.31	pt.67	3792,3799,2451
162. Engineering & scient. instr.	pt.109	62.01	pt.32	69	3811
163. Mech-measuring devices	pt.109	62.02	pt.32	pt.68	3823,3824,3829
164. Automatic temp. controls	pt.109	62.03	pt.32	pt.68	3822
165. Surgical & med. instr.	pt.110	62.04	pt.32	pt.68	3841
166. Surgical appl. & supplies	pt.110	62.05	pt.32	pt.68	3842
167. Dental equip & supplies	pt.110	62.06	pt.32	pt.68	3843
168. Optical instr & lenses	pt.111	63.01	pt.32	pt.70	383
169. Ophthalmic goods	pt.111	63.02	pt.32	pt.70	385
170. Photographic equip.	112	63.03	pt.32	pt.70	386
171. Watches & clocks	113	62.07	pt.32	pt.68	387
172. Jewelry & silverware	114	64.01	pt.33	pt.71	391,3961
173. Musical instr. & sport. goods	115	64.02-04	pt.33	pt.71	393,394
174. Other misc mfg.	116	64.05-12	pt.33	pt.71	395,396 (exc. 3961), 399
					(exc. 39996)
175. Railroad transportation	117	65.01	35	73	40,474,pt.4789
176. Local transit & intercity buses	118	65.02	36	74	pt.41

Table 1.1.Relation of Minnesota 214-Industry Code to Selected Minnesota and U.S. Industry Codes Based on Standard Classification System (concluded).

MN 214-Industry Code No. Title	BLS 154- Ind.	USDC 497- Ind.	Minnesota		SIC Code (1972 edition)
			55- Ind.	95- Ind.	
177. Truck transportation	119	65.03	37	75	42,pt.4789
178. Water transportation	120	65.04	pt.34	pt.72	44
179. Air transportation	121	65.05	38	76	45
180. Pipeline transportation	122	65.06	pt.34	pt.72	46
181. Transportation services	123	65.07	pt.34	pt.72	47 (exc. 474,pt.4789)
182. Communications, exc. radio,TV	124	66.00	pt.39	77	48 (exc. 483)
183. Radio & TV broadcasting	125	67.00	pt.39	78	483
184. Electric utilities	126	68.01	40	79	pt.491,pt.493
185. Gas utilities	127	68.02	41	80	492,pt.493
186. Water & sanitary services	128	68.03	42	81	494-497,pt.493
187. Wholesale trade	129	69.01	43	82	50,51(exc.mfgrs.,sales off.)
188. Retail trade	pt.130	69.02	44	pt.83	52-57,59,7396,pt.8042
189. Banking	131	70.01	pt.45	pt.84	60
190. Credit agencies & fin. brokers	132	70.02-03	pt.45	pt.84	61,62,67 (exc. pt.613)
191. Insurance	133	70.04-05	pt.45	pt.84	63,64
192. Owner-occupied real estate	134	71.01	-----	-----	not applicable
193. Real estate	135	71.02	46	85	65,66,pt.1531
194. Hotels & lodging places	136	72.01	pt.47	pt.86	70 (exc. dining)
195. Personal repair services	137	72.02	pt.47	pt.86	72 (exc.723,724),762-4, pt.7699
196. Barber & beauty shops	138	72.03	pt.47	pt.86	723,724
197. Misc. business services	139	73.01	pt.48	pt.87	73(exc.731,7396),769(exc. 7699)
198. Advertising	140	73.02	pt.48	pt.87	731
199. Misc. prof. services	141	73.03	pt.48	pt.87	81,89(exc.8922)
200. Eating & drinking places	pt.130	74.00	pt.44	pt.83	58,pt.70
201. Automobile repair	142	75.00	49	88	75
202. Motion pictures	143	76.01	pt.50	pt.89	78
203. Amusement & recr. serv.	144	76.02	pt.50	pt.89	79
204. Doctors' & dentists' serv.	145	77.01	pt.51	pt.90	801-803,8041
205. Hospitals	146	77.02	pt.51	pt.90	806
206. Other medical serv.	pt.147	77.03	pt.51	pt.90	074,8049,805,807-9
207. Educational services	148	77.04	pt.51	pt.90	82
208. Nonprofit organizations	149	77.05	pt.51	pt.90	84,86,8922
209. Social services	pt.147	77.06-9	pt.51	pt.90	8321,8331,8351,8361,8399
210. Post office	150	78.01	pt.52	pt.91	4311
211. Other Fed. enterprise	152	78.02-04	pt.52	pt.91	pt.491,pt.613,several others
212. Local government transit	153	79.01	pt.53	pt.92	pt.41
213. Other state-local enterprise	154	79.02-03	pt.53	pt.92	pt.491,several others
214. Scrap, used and second	---	81.00	pt.54	pt.95	
Rows:					
215. Total intermediate inputs	---	T.I.I.			---
216. Dummy Industry	---	82,83,84, 85	54	95,97	---
217. Noncomparable Import	---	80.00			---
218. Value Added Total		V.A.			
219. Total industry output		T.I.O.			
220. Employee Compensation	---	88.00			---
221. Indirect Business taxes		89.00			---
222. Property-type income		90.00			---
Columns:					
215. Total intermediate use	---	T.I.U.			---
216. Pers. consumption exp.	---	91.00			---
217. Gross priv. cap. form.	---	92.00			---
218. Change in bus. inv.	---	93.00			---
219. Exports	---	94.00			---
220. Imports	---	95.00			---
221. Fed. gov.	---	96.00, 97.00			---
222. State-local	---	98.00, 99.10 - .30			---
223. Total final demand	---	T.F.D.			---
224. Total commodity output	---	T.C.O.			---

industry groupings in related studies and data sources are indicated in Table 1.1.

Study findings reported here start with a brief discussion of principal state economic indicators -- employment, earnings, income, and gross state product. This is followed by an examination of industry purchases and sales including imports and exports. The report concludes with further assessment of the economic importance of agriculture-related industry as measured by its short-term and, also, long-term contributions to gross state product and total economic activity in the state.

#### Economic Indicators

Economic indicators presented in this section are primarily measures of industry sales and purchases, including purchases of primary inputs and final products. Summary totals of these measures are compared with corresponding estimates of employment and earnings. Effects of changes in employment and earnings on personal income levels in the two periods are examined, also.

##### Industry sales and income payments

Industry gross output levels denote industry sales. In 1972, industry gross output exceeded \$38 billion (Table 2.1). This total grew at an annual rate of 2.8 percent to \$45.4 in 1977 (in 1972 dollars).

Largest annual rates of increase were estimated for agriculture; finance, insurance and real estate; and services. For mining and construction, the estimated changes were negative (in constant dollars).

Income payments to resource owners (i.e., primary inputs) are represented by value added. The total income payments for primary inputs utilized in Minnesota increased from \$18.8 billion in 1972 to \$22.5 billion in 1977 (in 1972 dollars). This increase was equivalent to an annual rate of 3.7 percent.

Table 2.1. Estimated gross output and value added (in 1972 dollars) of specified industry, Minnesota, 1972 and 1977. 1/

Industry	Gross Output		Annual Change, 1972-77 (pct.)	Value Added		
	1972 (mil.dol.)	1977 (mil.dol.)		1972 (mil.dol.)	1977 (mil.dol.)	1972-77 (pct.)
Agriculture	3,280	4,207	5.1	1,236	1,649	5.9
Mining	666	561	-3.4	276	230	-3.6
Construction	2,965	2,924	-0.3	1,360	1,359	-0.0
Manufacturing	13,210	15,453	3.2	4,299	5,037	3.2
Trans., Comm., Util.	3,042	3,712	4.1	1,735	2,136	4.2
Trade	5,429	6,049	2.2	3,777	4,256	2.4
Fin., Ins., Real Est.	4,264	5,421	4.9	3,392	3,974	3.7
Services	4,257	5,327	4.6	2,479	3,126	1.0
Govern. Enterprise <sup>2/</sup>	388	465	3.7	242	278	2.8
All Industry	38,623	45,448	2.8	18,763	22,460	3.7

1/ Unpublished data from University of Minnesota Two-Region Input-Output (TRIO) Computer Model.

2/ Other government employment is excluded.



Largest annual rates of increase in the value of primary inputs were estimated, again, for agriculture and finance, insurance, and real estate and the smallest for mining and construction. The relative changes in the value added varied more than the relative changes in gross output for the five-year period.

Agriculture accounted for less than 10 percent of industry gross output and less than seven percent of industry value added in 1972 and 1977. Manufacturing, including food products, accounted for more than a third of industry gross output and a fifth of industry value added. Even with food products excluded from the manufacturing totals, agriculture-related industry lagged behind the manufacturing industry totals. In value added, agriculture lagged behind five of the nine industry groups listed in Table 2.1.

#### Employment and earnings

Economic importance of agriculture-related industry is represented, also, by employment and earnings. Employment in agriculture increased less rapidly, than the industry average while earnings in agriculture increased more rapidly as shown in Table 2.2. However, wide differences occurred among individual industries. Mining and federal government employment, for example, declined during the 1972-1977 period, while trade and service employment increased faster than the industry average.

Earnings of the employed work force are shown in both current and constant 1972 dollars to separate real increases from the large inflationary impact (of 8.7 percent per year) on total earnings. The increase in real earnings was only 2.1 percent per year (compared with 11 percent in current dollars). The percentage increase in agricultural earnings was the largest of the nine industry groups -- more than twice the industry average.

Earnings per worker by industry are compared in Table 2.3. Unlike total earnings, real earnings per worker declined in six of the nine industry

Table 2.2. Estimated employment and earnings of employed civilian work force in specified industry, Minnesota, 1972 and 1977. 1/

Industry	Employment		Annual Change, 1972-77 (pct.)	Earnings (1972 dollars)			
	1972 (thou.)	1977 (thou.)		1972 (mil. \$)	1977 Current Dollars (mil. \$)	1977 Constant Dollars (mil. \$)	Annual Change, 1972-77
							Current Dollars (pct.) Constant Dollars (pct.)
Agriculture	151.9	163.0	1.4	979.0	1,879.8	1,237.3	13.9 4.8
Mining	14.7	12.8	-2.7	155.2	258.5	170.1	10.7 1.9
Construction	73.4	81.4	2.1	859.1	1,374.7	904.9	9.9 1.0
Manufacturing	344.0	344.3	0.1	3,257.7	5,332.3	3,510.0	10.4 1.5
Trans., Comm., Util.	96.0	97.4	0.3	1,026.8	1,734.0	1,141.4	11.0 2.1
Trade	375.1	451.4	3.8	2,410.2	4,008.6	2,638.6	10.7 1.8
Fin., Ins., Real Est.	77.3	88.7	2.8	689.8	1,235.1	819.6	12.5 3.5
Services	304.4	385.7	4.8	1,853.2	3,374.8	2,221.4	12.7 3.7
Private, Total	1,436.9	1,624.2	2.5	1,148.0	19,257.5	12,676.2	11.6 2.6
Government, Total	257.7	282.5	1.9	2,108.6	3,116.9	2,051.7	8.1 -0.5
Fed. Civilian <u>2/</u>	30.3	29.6	-0.5	335.5	492.0	323.8	8.0 -1.7
State and Local <u>2/</u>	227.4	252.9	2.1	1,609.2	2,624.9	1,727.9	9.2 0.4
All Industry	1,694.6	1,906.7	2.6	13,256.6	22,374.4	14,727.9	11.0 2.1

1/ U.S. Department of Commerce, Regional Economic Information System, Unpublished Data, 1980.

2/ Including government enterprise.

Table 2.3. Estimated earnings of employed work force (in 1972 dollars) in specified industry, Minnesota, 1972 and 1977. 1/

Industry	Earnings Per Worker			Annual Change, 1972-77	
	1972	1977		Current Dollars (pct.)	Constant Dollars (pct.)
	(dol.)	Current Dollars (dol.)	Constant Dollars (dol.)		
Agriculture	6,445	11,533	7,591	12.3	3.3
Mining	10,558	20,195	13,289	13.8	4.7
Construction	11,704	16,888	11,117	7.6	-1.0
Manufacturing	9,470	15,487	10,195	10.3	1.5
Trans., Comm., Util.	10,696	17,803	11,719	10.7	1.8
Trade	6,425	8,880	5,845	6.7	-1.9
Fin., Ins., Real Est.	8,924	14,037	9,240	9.5	0.7
Services	6,088	8,750	5,759	7.5	-1.1
Private, Average	7,758	11,850	7,805	8.8	0.1
Government, Average	8,182	11,033	7,263	6.2	-2.4
Fed. Civilian <u>2/</u>	11,073	16,622	10,939	8.5	-0.2
State and Local <u>2/</u>	7,433	10,379	6,832	6.9	-1.7
All Industry	7,823	11,735	7,724	8.4	-0.3

1/ U.S. Department of Commerce, Regional Economic Information System, Unpublished Data, 1980.

2/ Including government enterprise.

groups during the five-year period from 1972 to 1977. Losses in real earnings were estimated for trade and state government employment. The largest gains were estimated for mining and agriculture employment. Indeed, for the trade and service industry groups as a whole, the sharp increases in total employment were accompanied by losses in real earnings per worker.

The trade and service industries offered the most employment opportunities for young entrants to the labor force and also for part-time workers. Both trends reduced real earnings per worker.

#### Personal income

Total earnings of the employed work force are reported by place of work. Total personal income, however, is reported by place of residence. A residence adjustment converts total earnings, by place of work, to total earnings by place of residence, as shown in Table 2.4.

Total earnings by place of residence (after adjustment, also, for personal contributions to social insurance) increased from \$16.9 billion in 1972 to \$28.2 in 1977. In real dollars, the increase was at annual rate of 1.9 percent. Thus, personal income increased more rapidly than earnings. A sharp increase in transfer payments from federal and state governments to individuals accounted for the larger increase in personal income than earnings.

The relative increase of transfer payments as a component of personal income was accompanied by a relative decrease in total earnings. Thus, during the 1972-1977 period, total net earnings declined from 76.8 percent to 75.3 percent of total personal income. Property income payments also declined in relative importance.

#### Industry Purchases and Sales

The 214-industry listing in Table 1.1 is reduced to 32 industries in the presentation of summary data on industry purchases and sales (in 1972

Table 2.4. Personal income received from specified source, Minnesota, 1972 and 1977. <sup>1/</sup>

Income Source	1972 (mil. \$)	1977		Annual Change, 1972-1977	
		Current Dollars (mil. \$)	Constant Dollars (mil. \$)	Current Dollars (pct.)	Constant Dollars (pct.)
By Place of Work:					
Total Earnings	13,612.9	22,440.2	14,771.2	10.5	1.6
Less: Personal contr. soc. ins.	613.7	1,174.9	773.4	13.9	4.7
Net earnings	12,999.2	21,265.3	13,997.9	10.3	1.5
Plus: Residence adjust.	-28.8	-20.9	-13.8	-6.2	-13.7
By Place of Residence:					
Net earnings	12,120.7	21,244.4	13,984.1	10.4	1.5
Plus: Property income	2,120.7	3,633.3	2,391.6	11.4	0.7
Plus: Transfer payments	1,778.3	3,336.1	2,196.0	13.4	4.3
Personal Income, Total	16,896.5	28,213.8	18,571.7	10.8	1.9

<sup>1/</sup> U.S. Department of Commerce, Regional Economic Information System, Unpublished Data, 1980.

dollars). Total sales and purchases are represented as output disbursements to, and input purchases from, the 32 industries shown in Table 3.1. The sales and purchases are summarized for three purchasing sectors (intermediate, primary or value added, and import) and three demand sectors (intermediate, final local and export). The industry classification in Table 3.1 was used earlier in a related study of export-producing industry in Minnesota (7).

Location of the numerical entries in Table 3.1 to corresponding numerical entries in a 32 x 32 interindustry transactions table is represented by the row and column headings in Table 3.2. Total industry purchases (Row 38) and sales (Col. 38) are designated, respectively, as Gross Outlay and Gross Output in Table 3.2. By definition, the two are equal for each industry. Intermediate purchases and sales, however, are not equal for each industry (as shown earlier in Table 3.1). Total intermediate input purchases (Row 33) are the total purchases of intermediate inputs from in-state producing industries while total intermediate output disbursements (Column 33) are the total sales of industry output to in-state purchasing industries. All of the interindustry transactions are represented by Quadrant I in the conventional input-output table.

Quadrants II, III and IV in Table 3.2 represent the major economic accounts of a state or region, namely, Final Product, Income and Institutional. The Final Product Account includes all purchases of households and governments in the state or region and the capital purchases of business. This account shows the local disposition of the income earned in the preceding year. Exports to rest of nation (intermediate and final demand sectors), while not included in the Final Product Account, are included in Quadrant II.

Quadrant III represents the Income Account of the state or region. It shows, in the income payments for primary inputs, their contribution to the

TABLE 3.1. OUTPUT DISBURSEMENTS AND INPUT PURCHASES OF SPECIFIED INDUSTRY, MINNESOTA, 1977. 1/

INDUSTRY	INPUT PURCHASES				OUTPUT DISBURSEMENTS				
	GROSS OUTPUT	INTERMEDIATE	VALUE ADDED	TOTAL IMPORTS	INTERMEDIATE DEMAND	FINAL DEMAND	ALLOCATED U.S. NET	RON	TOTAL
NO. TITLE	(\$1000)	(\$1000)	(\$1000)	(\$1000)	(\$1000)	(\$1000)	(\$1000)	(\$1000)	(\$1000)
1 DAIRY FARM	614111.	316689.	259801.	37621.	598542.	2764.	-338.	12805.	12468.
2 POUL., EGGS	161561.	113846.	19457.	28259.	122525.	31908.	2171.	7128.	9299.
3 MEAT AN.	1444101.	1019511.	268285.	156305.	1408720.	27242.	15903.	8138.	24041.
4 FOOD, FEED	1212635.	405155.	643375.	164105.	767925.	78058.	92980.	366651.	+59631.
5 VEGETABLES	97331.	22903.	64497.	9930.	35633.	61700.	12112.	0	12112.
6 SUGAR CROP	101469.	31231.	53953.	16315.	24048.	3630.	3558.	73790.	77343.
7 OIL-BEARIN	418837.	116803.	262633.	39401.	214550.	74485.	71849.	129812.	201651.
8 OTHER CROP	67239.	19151.	38632.	10455.	22463.	23500.	6547.	21276.	27823.
9 FOR., FISH.	9125.	3177.	5147.	801.	12372.	-3247.	-6139.	0	-6139.
10 AGR., FOR.,	80163.	37608.	33336.	9219.	82640.	-2477.	-6080.	0	-6080.
11 MINING	561382.	247944.	230119.	83319.	60235.	-11469.	-12612.	512615.	500004.
12 CONSTRUCTI	2923640.	1247099.	1359381.	317170.	589652.	2255881.	-129342.	78107.	-51336.
13 MEAT PROD	1939189.	1453518.	237377.	248294.	412407.	382997.	-93855.	1143786.	1049334.
14 DAIRY PROD	1589281.	1305848.	247430.	36033.	529802.	233808.	3446.	825671.	829117.
15 FRUIT & VE	447444.	257498.	125501.	64445.	91867.	177752.	-33479.	177826.	144347.
16 CRAIN MILL	631568.	435822.	146532.	49215.	274768.	104436.	29835.	255394.	285229.
17 BAKERY	134135.	58501.	68099.	7544.	29697.	104448.	-13891.	0	-13881.
18 SUGAR PROD	180218.	111279.	52258.	16681.	110777.	58790.	-19405.	10650.	-8754.
19 SOYBEAN, V	308315.	259221.	31386.	17708.	121098.	14417.	-2124.	172805.	170675.
20 ALCH. BEV.	356464.	199626.	127332.	29506.	92862.	197891.	-39.	65711.	65672.
21 MISC. FOOD	116240.	57854.	33939.	24476.	41794.	70275.	-31869.	4170.	-27698.
22 CHEM. & AL	602300.	261021.	193697.	147581.	306622.	224323.	35445.	71355.	106799.
23 PETR. REF.	390279.	85658.	93441.	21180.	216664.	173615.	14372.	0	14372.
24 FARM MACH.	219874.	88556.	89817.	41502.	47913.	116139.	7413.	55822.	63235.
25 OTHER MFG.	9813565.	4180393.	4001455.	1631706.	4502672.	2827711.	291589.	2483182.	2774771.
26 TRANSPORT	1802789.	581505.	1083623.	157662.	909118.	554805.	111965.	338867.	450832.
27 COMM., UTI	1909240.	641066.	1072095.	196079.	1020262.	768792.	-62988.	120186.	57197.
28 WH. & RET.	6048797.	1579274.	4255725.	213779.	1508236.	4027130.	348708.	513561.	862269.
29 FIN., INS.,	5421462.	1325945.	3979315.	116202.	2002764.	3364595.	116389.	54103.	170491.
30 SERVICES	5327106.	1866655.	3126462.	333990.	1944929.	3020594.	262228.	361583.	623810.
31 GOVT ENT.	465479.	165216.	276024.	24339.	387413.	72037.	-11669.	6023.	-5646.
32 SCRAP	52710.	33354.	0.	19356.	36972.	-16711.	11154.	32449.	43603.
33 SUB-TOTAL	45448049.	18527906.	22460063.	4460079.	18527906.	19016693.	1013844.	7903450.	8917294.
FARM(1-10)	4206572.	2085045.	1649116.	472411.	3289416.	297564.	192563.	619592.	812154.
AG.REL.	5586614.	4081312.	10355875.	469426.	1663268.	1271508.	-129532.	2651838.	2522337.

1/ Based on Tables 6, 7 and 8 from Minnesota Two-Region Input-Output Computer Model using forecast 1977 U.S. interindustry transactions table in 1972 dollars.

Table 3.2. Schematic Representation of Row and Column Entries in a Regional Interindustry Transactions Table.

Intermediate Purchases				Final Purchases				Gross Output
Industry or Sector No. Title	Ind. 1	Ind. 32	Total 33	House-	Local	Final	Exports	
				hold 34	Business 35	Demand Government 36	to Rest- of-Nation 37	
In-state producing industries:								
1.	$X_{1.1}$	$\dots X_{1j} \dots X_{1.32}$	$^{32} \sum_{j=1} X_{1j}$	$X_{1.34}$	$\dots$	$\dots$	$X_{1.37}$	$X_1$
.	$\vdots$							$\vdots$
.	$\vdots$							$\vdots$
.	$X_{i1}$	QUADRANT I	$^{32} \sum_{j=1} X_{ij}$		QUADRANT II			$X_i$
.	$\vdots$							$\vdots$
32.	$X_{32.1}$	$X_{32.32}$	$^{32} \sum_{j=1} X_{32j}$	$X_{32.34}$	$\dots$	$\dots$	$X_{32.37}$	$X_{32}$
33. Total	$^{32} \sum_{i=1} X_{i1}$	$^{32} \sum_{i=1} X_{ij} \dots$	$^{32} \sum_{i=1} \sum_{j=1} X_{ij}$	$^{32} \sum_{j=1} X_{34}$	$\dots$	$\dots$	$^{32} \sum_{i=1} X_{i37}$	$^{16} \sum_{i=1, j=32} X_{ij}$
In-state primary input sectors:								
34. Household	$X_{34.1}$							$X_{34}$
35. Business	$X_{35.1}$							$X_{35}$
36. Government	$X_{36.1}$							$X_{36}$
Rest-of-nation producing industries:								
37. Imports	$X_{37.1}$							$X_{37}$
38. Gross Outlays	$X_1$	$\dots X_j \dots X_{32}$	$^{32} \sum_{j=1} X_j$	$X_{34}$	$\dots$	$\dots$	$X_{37}$	$X_{38}$
								$^{32} \sum_{i,j=1} X_{i,j}$



gross national product. The income payments are made to each of the three economic units: household, government, and business. Households and businesses, in turn, make additional income payments to government, but in the next accounting period. They also spend this income in final purchases. Like Quadrant II, Quadrant III includes income payments to rest-of-nation producing industries for imports of intermediate inputs.

Quadrant IV represents the inter-institutional transactions, for example, the income tax payments of households and businesses to governments. The Institutional Account is usually omitted in the input-output table, which is a static, cross-sectional representation of a state or regional economy. In a dynamic model, however, the inter-institutional accounts must be included to provide for income and savings transfers from one accounting period to the next.

The Final Product Account and the Income Account are balanced each year as indicated by the identity,

$$\text{Local Value Added} = \text{Local Final Product} + \text{Exports} - \text{Imports}.$$

If income payments for primary inputs exceed final purchases, then an excess supply exists, which is exported. To balance the two accounts, total exports must exceed total imports. This identity is used later to identify the contribution of each producing industry to the gross state product.

Total industry purchases in 1977 were \$45.4 billion (in 1972 dollars) in 1977, as shown in Table 3.1. The 10 agricultural industries listed in Table 3.1 accounted for \$4.2 billion and the nine food products manufacturing industries accounted for \$5.6 billion in purchases. The two industry groups thus accounted for \$9.8 billion, or 21.5 percent, of total in-state purchases of the Minnesota private business sector. The proportion of net exports of all industry originating from the agriculture and food products

manufacturing industry groups was even higher -- \$3.3 billion (in 1972 dollars), or 37.4 percent of the total.

#### Livestock and crop agriculture

The 10-industry livestock and crop agriculture industry group in Table 3.1 corresponds with the agriculture industry group in Table 2.1. In 1977, the agriculture industry group provided a total of 162,976 jobs with total earnings (wages, salaries and proprietorial income) of \$1,237,300,000 (in 1972 dollars). While the average earnings per worker was \$7,591, average output per worker was \$25,807 and average value added per worker was \$10,117. Earnings were 29.4 percent of gross output and 75 percent of unadjusted (for inventory valuation) value added.

Total purchases of the Minnesota agriculture industry group in each of the three sectors -- intermediate, primary and import -- are summarized as follows:

<u>Input Sector</u>	<u>Total Purchases</u>			<u>Per \$1,000 Agr. Output (\$)</u>	<u>Per Agr. Worker (\$)</u>
	<u>All Industry (mil. \$)</u>	<u>Agri- culture (mil. \$)</u>	<u>Agr. as Prop.All Industry (%)</u>		
Intermediate	18,528	2,085	11.2	496	12,792
Primary	22,460	1,649	7.3	392	10,117
Import	4,460	472	10.6	112	2,898
All Sectors	45,448	4,206	8.9	1,000	25,807

The summary data show that total purchases of the agriculture industry group from the three input sectors were not more than 11.2 percent of all industry purchases in 1977. Intermediate input purchases were the largest, not only as a proportion of all industry intermediate purchases, but, also, per \$1,000 of agriculture industry output and per agriculture industry worker.

Wide differences exist within the agriculture industry group in sector distribution of input purchases. The meat animal industry accounts for the largest share and the forestry and fisheries industry accounts for the

smallest share of intermediate input purchases. The large intermediate input purchases include purchases of feeder livestock from other livestock producers in the state and also from rest of nation as imports. All imports are intermediate inputs. In comparison, food and feed grain farms have the largest value added while intermediate input purchases are less than half of total purchases of livestock producers. Imports of intermediate inputs of food and feed grain farms also are the highest among the 10 agricultural industries. These intermediate inputs from the rest of nation include fertilizer, seed, petroleum products, machinery and equipment.

In summary, the agriculture industry group is an important market for intermediate inputs, accounting for more than 11 percent of all intermediate input purchases. Imports of intermediate inputs are nearly as large as local purchases on a percentage basis.

Detailed interindustry transactions data from the 214 by 214 inter-industry transactions table are presented next to illustrate the "backward" linkages, namely, the agricultural industry purchases of intermediate inputs from producing industries in Minnesota (Table 3.3). Total income payments for primary inputs are included, also (as total value added). Presented in Table 3.3 are, therefore, the numerical entries for the agricultural industries in Quadrant I, as shown earlier in Table 3.2.

Presentation of the detailed input-output structure of in-state agricultural industries reveals the complexity of Minnesota agriculture. The backward linkages represent agriculture's dependence on domestic suppliers, both in-state and rest-of-nation. The nature and extent of this market dependence of Minnesota agriculture is discussed further in the next section.

Major in-state agricultural input suppliers are the agricultural industries themselves, the food products manufacturing industries, transportation industries, and trade and service industries. Thus, the agricultural industries

Industry No. Title	(million dollars)																		
	Dairy Farm	Poul- try &	Meat Anim-	Misc Live	Food Grain	Feed Grain	Crude Seed	Fruits Tree	Nuts	Vege- tables	Sugar Crop	Misc Crop	Oil- Bear-	Fore- st	Green- house	For Prod	Agri- culture & Fish Prod	Agri- culture & Fish Services	
1 Dairy Farm Prod	0	0	4.4	0	0.1	7.6	0	0	2/	0	0	0	0.5	0	0	0	0	0.7	
2 Poultry & Eggs	0	0	0	0	0.2	2.0	0	0	2/	0	0	0	0.6	0	0	0	0	3.9	
3 Meat Animals	0	0	408.5	0	4.4	22.6	0	0	2/	0	0	0	3.7	0	0	0	0	3.2	
4 Misc Livestock	0	0	2.1	1.9	0.8	5.4	2/	0	2/	0.3	0.6	2/	1.4	2/	0.1	0.2	0	0.1	
6 Food Grains	2.8	0	12.4	2/	10.3	0	0	0	0	0	0	0	0	0	0	0	0	0.5	
7 Feed Grains	150.8	26.0	325.4	6.0	0	23.4	0	0	0	0	0	0	0	0	0	0	0	2.5	
8 Grass Seed	0	0	0	0	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0.1	
12 Vegetables	0	0	0.1	0	0	0	0	0	0	1.4	0	0	0	0	0	0	0	0.4	
13 Sugar Crops	0	0	0	0	0	0	0	0	0	0	3.7	0	0	0	0	2/	0	0.2	
14 Misc Crops	0	0	0	0	0	0.7	0	0	0	0	0	0.3	0	0	0	0	0	0.1	
15 Oil-Bearing Crops	0	0	0.2	0	0	0	0	0	0	0	0	0	23.5	0	0	0	0	0.8	
16 Forest Products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2/	0	
17 Greenhouse & Misc	0	0	0	0	0	0	0	2/	2/	1.2	0	0.1	0	2/	1.3	0	0.8	0	
18 Forestry & Fish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2/	0.1	0	
19. Agr. For., & Fish	9.9	12.5	14.5	0.1	2.6	11.5	0.1	0.1	2/	3.0	3.0	0.9	5.6	2/	0.4	0.1	1.3	0	
25 Stone & Clay Manuf	0	0	0	0	0.3	2.4	0	0	0	0.1	0.1	0.1	0.1	0	2/	0	2/	0	
33 Maint. & Repair	4.2	0.8	6.9	0.1	2.4	9.2	2/	2/	2/	0.6	0.9	2/	3.5	2/	0.2	0	1.1	0	
36 Meat Packing	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	2/	0	
48 Flour & Other Gr	1.8	0	1.1	0.3	0	0	0	0	0	0	0	0	0	0	0	0	2/	0	
51 Dog, Cat, Other	0	0	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.4	0	
52 Prepared Feeds NEC	52.0	45.4	60.5	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
57 Sugar	2.4	0	1.5	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
59 Malt Liquors	0.6	0	0.4	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
65 Soybean & Veg Oil	0.7	3.4	18.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
66. Animal & Mar Fats	0.1	2/	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
70 Mfgd Ice & Food	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	
74 Misc Textile Prod	0.8	2/	2/	0	2/	2.9	0	0	0	2/	0	0	2/	0	0.1	0.2	0.7	0	
77 Fabricated Tex	0	0	0	0	0	0	0	2/	0	0.1	0	0	0	0	0	2/	0.1	0	
84 Other Wood Prod	0.1	2/	0.1	0	2/	0.1	0	0	0	2/	2/	0	2/	0	2/	0	0	0	
85 Wood Containers	2/	2/	2/	0	2/	2/	0	0.1	0	2/	0	0	2/	0	0	0	0.2	0	
93. Other Paper Prod	2/	1.9	2/	0	0	0.1	0	2/	2/	0.2	0	0	2/	0	0	0	0.1	0	
94 Paperboard Cont	0.1	0	0	0	0	0	0	0	0	2/	0	0	0	0	0.1	0	1.7	0	
96 Periodical & Book	0.1	2/	0.2	2/	2/	0.2	0	2/	0	2/	2/	0	0.1	0	2/	0	0.1	0	
97 Misc Print & Pub	2/	2/	2/	0	2/	2/	0	0	0	2/	0	0	2/	0	2/	2/	0.2	0	
98 Indus Inorg	2/	2/	2/	2/	0.1	1.3	2/	2/	0	0.1	0.1	2/	0.4	2/	2/	2/	0	0	
99 Agricultural Chem	0.2	2/	0.2	2/	2.3	15.7	2/	2/	2/	1.2	2.6	1.6	3.4	2/	2/	2/	0.4	0	
100 Misc Chemical Prod	0.6	0.2	1.2	0.1	2/	0.2	2/	0	0	2/	2/	0	0.1	2/	2/	2/	2/	0	
103 Drugs	1/	0.1	0.1	2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
104 Cleaning & Toilet	2.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
106 Petroleum Refining	1.5	0.5	2.8	0.2	3.2	15.8	2/	2/	2/	0.6	0.9	0.2	4.9	2/	0.3	0.1	0.7	0	
108 Tires & Inner T	0	0	0	0	0	0	0	0	0	2/	2/	2/	2/	0	2/	0	2/	0	
110 Plastic Products	0	0	0	0	0	0.4	0.1	0	0	0	0	0	0	0	0.3	0	0	0	
112 Footwear & Other	0.1	0	2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
120 Misc Stone & Clay	0	0	0	0	2/	0.2	0	0	0	2/	2/	2/	2/	0	2/	0	0	0	
126 Metal Containers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	
128 Fabricated Metal	0.1	2/	0.1	2/	2/	0.1	0	0	0	2/	2/	0	2/	0	2/	0	0	0	
130 Metal Stampings	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
131 Outlery Hardwares	0.6	0.2	1.3	2/	0.2	0.9	2/	2/	2/	0.1	0.1	2/	0.4	2/	2/	0.1	0	0	
132 Other Fab Metal	2/	2/	2/	2/	2/	1.0	0	0	0	2/	0	0	2/	0	0	0.1	0.5	0	
133 Engines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2/	0.1	0	
134 Farm Machinery	3.1	0.5	5.7	2/	1.7	0.9	2/	2/	2/	0.5	0.6	0.1	3.7	2/	0.2	0	0.4	0	
139 Gen Industrial	0.1	2/	0.1	2/	0.1	0.3	0	0	0	2/	2/	0	0.1	2/	2/	0.1	2/	0	
140 Machine Shops	0.1	2/	0.2	0	2/	0.2	2/	0	0	2/	2/	0	0.1	0	2/	0	0	0	
148 Electric Light	2/	2/	0.1	0	2/	2/	0	0	0	2/	0	0	2/	0	2/	2/	0.2	0	
155 Misc Elec Equip	0.2	2/	0.4	2/	0.2	1.0	2/	0	0	2/	0.1	0	0.4	2/	2/	2/	0.2	0	
156 Motor Vehicles	0.1	2/	0.2	2/	2/	0.1	0	0	0	2/	2/	0	0.1	0	2/	0	0.1	0	
158. Boat Building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	
161 Other Transp Eq	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
174 Other Misc Mfg	2/	2/	0.1	0	2/	0.1	0	0	0	2/	2/	0	2/	0	2/	0	0.1	0	
175 Railroad Trans	2.8	1.7	5.9	0.2	1.2	6.4	2/	2/	2/	0.4	0.7	0.5	1.0	0	2/	2/	0.2	0	
176 Local Transit	2/	0	2/	0	0	2/	0	0	0	0	0	0	2/	0	0	2/	0.4	0	
177. Truck Trans	19.8	0.8	6.5	0.1	0.8	8.3	2/	2/	2/	0.7	0.4	0.2	1.3	2/	0.2	0.1	0.4	0	
178 Water Trans	0.1	0.1	0.3	2/	0.1	0.9	2/	2/	0	2/	2/	2/	0.2	0	2/	2/	2/	0	
179 Air Transpor	2/	2/	2/	2/	2/	0.1	0	0	0	2/	0	0	2/	0	0	2/	1.4	0	
180 Pipeline Trans	0.1	2/	0.1	2/	0.1	0.7	2/	0	0	2/	2/	0	0.2	0	2/	2/	2/	0	
182 Comm., exc Radio	1.2	0.3	2.8	0.1	0.5	1.9	2/	2/	2/	0.2	0.2	2/	0.8	2/	0.1	2/	0.3	0	
184 Electric Utilities	4.9	1.3	11.3	0.2	0	0	0	0	0	0	0	0	0	0	0.2	2/	0.6	0	
185 Gas Utilities	0	0.1	0	2/	0.8	3.5	2/	2/	2/	2/	0.1	2/	0.1	2/	0.2	2/	0.2	0	
186 Water & San Serv	0.1	2/	0.2	2/	0.6	6.5	2/	2/	0	0.3	0	0	0.4	0	2/	0	0	0	
187 Wholesale Trade	13.4	6.8	45.5	0.8	5.7	38.4	0.1	0.2	2/	5.1	3.3	2.0	8.5	2/	1.6	0.3	2.1	0	
188 Retail Trade	0.5	2.0	1.4	0.1	0	2/	0	2/	2/	0.7	0	0	0	2/	0.8	2/	0.5	0	
189 Banking	5.7	0.7	11.7	0.1	1.3	5.9	2/	2/	2/	0.6	1.0	0.3	2.6	2/	0.1	2/	0.3	0	
190 Credit Agencies	0.2	0.1	0.1	2/	0.1	0.3	0	2/	0	2/	0	0	0.2	2/	2/	2/	0.3	0	
191. Insurance	3.4	0.5	6.3	0.1	1.8	7.2	2/	2/	2/	0.4	1.2	0.1	3.1	2/	0.1	0.1	0.4	0	
193 Real Estate	15.1	2.2	26.9	0.7	31.5	93.5	0.2	0.2	2/	3.7	9.9	1.8	38.5	0.1	0.4	0.1	1.7	0	
194 Hotels & Lodging	2/	2/	2/	0	2/	2/	0	0	0	2/	0	0	2/	0	0	2/	0.3	0	
195 Personal Repair	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2/	0.1	0	
197 Misc Bus Services	1.7	0.2	3.3	0.1	2.2	13.1	2/	2/	2/	0.5	1.0	0.3	5.1	2/	0.2	0.1	3.3	0	
198 Advertising	0.1	2/	0.3	2/	0.1	0.2	0	2/	0	2/	2/	0	0.1	2/	0.4	2/	0.4	0	
199 Misc Prof Serv	0.8	0.2	1.8	2/	0.3	1.2	2/	2/	2/	0.1	0.1	2/	0.5	2/	2/	2/	0.8	0	
200 Eating & Drinking	0.2	0.1	0.6	2/	0.1	0.4	2/	2/	0	2/	2/	2/	0.2	2/	2/	2/	0.5	0	
201 Automobile Repair	1.7	0.2	3.4	2/	0.5	2.4	2/	2/	2/	0.2	0.3	0.1	1.0	2/	0.1	0.1	1.1	0	
206 Other Medical Ser	1.0	4.5	3.3	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
208 Nonprofit Org	0.2	0.1	0.5	2/	0.1	0.3	2/	2/	0	2/	2/	2/	0.1	2/	2/	2/	0.2	0	
210 Post Office	0.1	2/	0.2	2/	2/	0.1	0	0	0	2/	2/	0	0.1	0	2/	2/	0.1	0	

make large purchases from a wide variety of Minnesota industries.

Output disbursements of the agriculture industry group vary greatly depending upon the location of the agricultural processing and its nature. The sector distribution of the total agricultural output shows the dominance of in-state agricultural processing activities as follows:

<u>Demand Sector</u>	<u>Total Disbursements</u>		<u>Agr. as Prop.All Industry</u> (%)	<u>Per \$1,000 Agr. Output</u> (%)	<u>Per Agr. Worker</u> (%)
	<u>All In- dustry</u> (mil. \$)	<u>Agri- culture</u> (mil. \$)			
Intermediate	18,528	3,289	17.8	782	20,180
Local Final	19,017	298	1.6	71	1,824
Export	7,903	620	7.8	147	3,803
All Sectors	45,448	4,207	8.9	1,000	25,807

Thus, total intermediate product sales were \$3.3 billion in 1977, or 17.8 percent of all industry intermediate product sales. Total intermediate product sales (to industries in Minnesota) and intermediate product purchases (from industries in Minnesota) were nearly \$5.4 billion (in 1972 dollars). The intermediate product sales of agriculture to food products manufacturing are discussed next, following the discussion of food products manufacturing industry purchases.

#### Food products manufacturing

The nine food products manufacturing industries accounted for twice the intermediate purchases of the agricultural industry group and three times their exports in 1977. Intermediate purchases totaled \$4.1 billion, or \$792 million more than the intermediate sales of the agriculture industry group. Total employment in this industry was only 50,713, or 3.1 percent of the state total of 1,926,251.

Distribution of food products manufacturing industry purchases from the three input-supply sectors in 1977 was as follows:

<u>Input Sector</u>	<u>Total Purchases</u>		<u>Food Prod. as Prop. All Ind.</u> (%)	<u>Per \$1,000 Product Output</u> (%)	<u>Per Food Product Worker</u> (%)
	<u>All In- dustry</u> (mil. \$)	<u>Food Prod.Mfg.</u> (mil. \$)			
Intermediate	18,528	4,081	22.0	731	80,478
Primary	22,460	1,036	4.6	185	20,427
Import	4,460	469	10.5	84	9,256
All Sectors	45,448	5,586	12.3	1,000	110,161

Intermediate input purchases from industries in Minnesota were the largest, followed by intermediate input purchases (imports) from industries in rest of Nation. Much of these purchases originated from the agriculture industry group in Minnesota and in rest of nation.

Output disbursements of the food products manufacturing industry group differed sharply from the agricultural output disbursements. Exports accounted for 47.5 percent of the total value of food products manufacturing output, which was equivalent to 33.6 percent of all industry exports, as shown below:

<u>Demand Sector</u>	<u>All In- dustry</u> (mil. \$)	<u>Food Prod.</u> (mil. \$)	<u>Food Prod. as Prop. All Ind.</u> (%)	<u>Per \$1,000 Food Prod. Output</u> (%)	<u>Per Food Product Worker</u> (%)
Intermediate	18,528	1,663	9.0	298	32,798
Local Final	19,017	1,272	6.7	227	25,073
Export	7,903	2,652	33.6	475	52,290
All Sectors	45,448	5,587	12.3	1,000	110,161

Each food products manufacturing job produced, on the average, \$52,290 of exports to rest-of-nation demand sectors. Also, about 30 percent of the total output was disbursed to other industries and 25 percent was disbursed to local final markets, largely households.

Further expansion of the food products manufacturing industry group from nine industries to 35 industries would provide comparable industry

detail for the two industry groups. The detailed industry breakdown is available from the original TRIO computer program print-outp.

### Interregional Trade

Interregional trade is represented by the imports from, and exports to, rest of nation supply and demand sectors. Two categories of imports are presented in the Minnesota input-output tables -- imports from rest of nation industries and noncomparable imports from rest of world industries. Exports also are represented in two categories -- allocated U.S. exports and imports and Minnesota exports to rest of nation.

Competitive U.S. exports and imports are the excess supply and deficit supply of U.S. industry output. They are allocated to Minnesota and rest of nation in proportion to industry gross output in the two-region input-output computer model (1 ). Similarly, Minnesota industry exports to rest of nation are equivalent to the excess supply of Minnesota industry output. The three exports, including competitive imports (which are negative exports), are equivalent to the net exports of Minnesota industry to rest of nation and rest of world markets.

Imports from, and exports to, rest of nation markets are designated as excess supply and deficit supply of industry output in Table 4.1. Excess or deficit supply of a Minnesota industry output is the algebraic difference between the gross output of an industry and the total requirement for the same industry output in all industry in Minnesota. This difference is derived, first, from the 214-industry input-output tables. The 214-industry listing is again summarized for 32 industries in this section.

### Livestock and crop agriculture

The livestock and crop agriculture industry group in Minnesota was a

net exporter in 1977. Industry outshipments to rest of nation were larger than inshipments of gross output from rest-of-nation industries to the crop and livestock agriculture industry group in Minnesota. Inshipments of livestock and crop agriculture industry outputs from rest of nation also were less than corresponding Minnesota industry outshipments.

Excess supply and deficit supply of Minnesota agricultural industry outputs are summarized for the 19 agriculture industries as follows:

<u>Producing Industry</u>	<u>Excess Supply</u>		<u>Deficit Supply</u>	
	<u>Total</u> (mil.\$)	<u>Prop. of</u> <u>All Ind.</u> (%)	<u>Total</u> (mil.\$)	<u>Prop. of</u> <u>All Ind.</u> (%)
Dairy Farm (1)	12.8	0.2	0	0
Poultry & Eggs (2)	7.1	0.1	0	0
Meat Animals (3)	0	0	352.2	4.6
Misc. Livestock (4)	8.1	0.1	0	0
Cotton (5)	0	0	36.2	0.5
Food Grain (6)	42.8	0.6	0	0
Feed Grain (7)	323.3	4.0	0	0
Grass Seed (8)	0	0	4.1	0.1
Tobacco (9)	0	0	7.9	0.1
Fruits (10)	0	0	67.3	1.0
Tree Nuts (11)	0	0	7.6	0.7
Vegetables (12)	0	0	5.4	0.1
Sugar Crop (13)	73.7	0.9	0	0
Misc. Crop (14)	21.3	0.3	0	0
Oil-Bearing C. (15)	129.9	1.6	0	0
Forest Products (16)	0	0	0.4	0
Greenhouse (17)	0	0	6.4	0.1
Forestry & Fish. (18)	0	0	22.8	0.3
Agr., For., Fish. (19)	0	0	47.1	0.6
Total Agriculture	619.6	7.8	559.4	7.3
Other Industry	7,283.8	92.2	7,084.7	92.7
All Industry	7,903.4	100.0	7,644.1	100.0

Food and feed grain outshipments were 4.6 percent of Minnesota industry exports in 1977. Wheat and corn were the principal export commodities. Oil-bearing crops, largely soybeans, were the next largest category of industry exports. They were followed by exports of sugar beets (to plants in North Dakota and Iowa) and miscellaneous livestock products, such as



wool and honey. Dairy farm exports were largely raw milk shipments to dairy processing plants in adjoining states.

Deficit supplies of agricultural industry outputs were estimated in five of the 10 agriculture industries in Table 4.1 (and in 11 of the 19 industries in the detailed print-out. For these industries, total requirements exceeded total supplies in varying proportions. In shipments of meat animals, although less than 20 percent of total meat packing industry requirements, accounted for 63 percent of the imports of agricultural products from rest of nation. Other crops, including grass seed, tobacco, fruits, tree nuts and vegetables, were the next largest category of imports, accounting for 24 percent of agricultural imports from rest of nation. Forest and fisheries products and agricultural, forest and fisheries services were third in total import value. Cotton is included among the imports from rest of nation because of the input purchases of soybean and vegetable oil (Ind. 65), fabric and thread (Ind. 72), miscellaneous textile products (Ind. 74), and hosiery and knit goods (Ind. 75) manufacturing plants in Minnesota.

A detailed industry breakdown of the exports and imports of Minnesota agricultural industries is presented in Tables 4.2 and 4.3. The industry breakdown in these tables compares with the industry breakdown in Table 3.3. Rather than in-state input purchases, rest-of-nation industry purchases are shown along with rest-of-nation industry sources of the imports of Minnesota agricultural industries.

Agricultural exports to rest of nation industries and markets are small compared with the imports of intermediate inputs for the agricultural industries. Largest among the export markets are rest-of-nation livestock farms, as shown in Table 4.2. Rest-of-nation dairy and poultry farms also are important domestic markets for Minnesota agriculture. In comparison, rest-of-nation food products manufacturing industries are less important markets.

TABLE 4.1. GROSS OUTPUT, TOTAL REQUIREMENTS, AND EXCESS AND DEFICIT  
SUPPLY OF SPECIFIED INDUSTRY OUTPUT, MINNESOTA, 1977. 1/

INDUSTRY NO. TITLE	GROSS OUTPUT	EXCESS SUPPLY		DEFICIT SUPPLY	
		TOTAL <u>2/</u> REQUIREMENT	PROPORTION OF GROSS OUTPUT	TOTAL <u>4/</u>	PROPORTION OF TOTAL REQUIREMENT
	(THOUS. DOL.)	(THOUS. DOL.)	(PCT.)	(THOUS. DOL.)	(PCT.)
1 DAIRY FARM	614111.	601306.	2.085	0	0
2 POUL., EGGS	161561.	154433.	4.412	0	0
3 MEAT AN.	1444101.	1788185.	.564	352223.	19.697
4 FOOD, FEED	1212635.	845984.	30.236	0	0
5 VEGETABLES	97331.	102767.	0	5437.	5.290
6 SUGAR CROP	101469.	27679.	72.722	0	0
7 OIL-BEARIN	418837.	289035.	30.991	0	0
8 OTHER CROP	67239.	177895.	31.642	131932.	74.163
9 FCR., FISH.	9125.	31880.	0	22754.	71.376
10 ACR., FOR.,	80163.	127223.	0	47061.	36.990
11 MINING	561382.	323365.	91.313	274598.	84.919
12 CONSTRUCTI	2923640.	78107.	2.672	56520.	1.948
13 MEAT PRODU	1939189.	803023.	58.983	7619.	.949
14 DAIRY PROD	1589281.	763610.	51.952	0	0
15 FRUIT & VE	447444.	309196.	39.743	39578.	12.800
16 GRAIN MILL	631568.	177826.	39.743	113377.	23.159
17 BAKERY	134135.	255394.	40.438	29358.	17.957
18 SUGAR PROD	180218.	163493.	0	7381.	4.171
19 SOYBEAN, V	308315.	176949.	5.910	38953.	22.327
20 ALCH. BEV.	356464.	172800.	56.046	122074.	29.570
21 MISC. FOOD	116240.	65711.	18.434	161121.	58.978
22 CHEM. & AL	602300.	4170.	3.588	764092.	59.002
23 PETR. REF.	390279.	71355.	11.847	329091.	45.747
24 FARM MACH.	219874.	719369.	0	0	0
25 OTHER MFG.	9813565.	55822.	25.388	4008666.	35.353
26 TRANSPORTA	1802789.	11339049.	25.304	121255.	7.649
27 COMM., UTI	1909240.	1583177.	18.797	232969.	11.522
28 WH. & RET.	6048797.	120186.	6.295	0	0
29 FIN., INS.,	5421462.	513561.	8.490	417214.	7.213
30 SERVICES	5327106.	54103.	.998	335255.	6.325
31 GOVT ENT.	465479.	361583.	6.786	25542.	5.266
32 SCRAP	52710.	484997.	1.294	0	0
33 SUB-TOTAL	45448049.	20261.	61.561	7644071.	16.916
		45186670.	17.390		

1/ Based on Tables 7 and 8 from Minnesota Two-Region Input-Output Computer Model using forecast 1977 U.S. interindustry transactions table in 1972 dollars.

2/ Gross output less export to rest of nation.

3/ Rest of nation industry net purchases of specified Minnesota industry\* output.

4/ Minnesota industry net purchases of specified rest of nation \*industry output.

Table 4.2. Exports of Specified Agriculture Industry Output (in 1972 dollars), by Exporting Industry, Minnesota and Rest of Nation, 1977.

Purchasing Industry or Sector	Dairy Farm	Poultry & Eggs	Misc. Livestock	Food Grain	Feed Grain	Sugar Crop	Misc. Crop	Oil-Bearing	Total
No. Title	(1)	(2)	(4)	(6)	(7)	(13)	(14)	(15)	
			(mil. \$)						
1. Dairy Farm	0	0	0	0.4	44.0	0	0	0	44.4
2. Poultry & Eggs	0	0	0	0	17.0	0	0	0	17.0
3. Meat Animals	0.1	0	0.5	3.2	163.8	0	0	0.1	167.9
4. Misc. Livestock	0	0	0.5	1/	3.4	0	0	0	3.9
5. Cotton	1/	1/	0.3	0	0	0	0	0	0.3
6. Food Grains	1/	1/	0.1	1.8	0	0	0	0	2.0
7. Feed Grains	0.1	1/	0.9	0	7.6	0	0	0.7	9.5
8. Grain Seed	0	0	1/	0	0	0	0	0	1/
9. Tobacco	0	1/	0.2	0	0	0	0	0	0.2
10. Fruits	0	1/	1/	0	0	0	0	0	1/
12. Vegetables	1/	1/	0.2	0	0	0	0	0	0.2
13. Sugar Crops	0	0	0.1	0	0	2.5	0	0	2.6
14. Misc Crops	0	0	1/	0	0	0	0.2	0	0.2
15. Oil-Bearing	1/	1/	0.2	0	0	0	0	7.1	7.4
17. Greenhouse	0	0	1/	0	0	0	0	0	1/
18. Forestry & Fish	0	0	0.9	0	0	0.9	0	0	1.8
19. Agr, For, Fish	0.1	0.3	0.1	0.4	3.2	0.8	0.2	0.9	5.9
36. Meat Packing	0	0	1/	1/	0.1	0	0	0	0.2
37. Sausages &	0	0	0	1/	1/	0	0	0	0.1
38. Poultry Dressing	0	3.3	1/	0	0	0	0	0	3.3
39. Poultry & Egg	0	0.3	0	0	0	0	0	0	0.3
40. Creamery Butter	0.4	0	0	0	0	0	0	0	0.4
41. Cheese, Nat Pr	1.5	0	0	0	0	0	0	0	1.5
42. Cond & Evap	0.7	0	0	0	0	0	0	0	0.7
43. Ice Cream &	0.1	0	0	0	0	0	0	0	0.1
44. Fluid Milk	9.6	0	0	0	0	0	0	0	9.6
47. Other Pres	0	0	0.3	0	0	0	1.5	0	1.8
48. Flour & Other	0	0	0	12.6	3.0	0	0	0	15.7
49. Cereal Prep	0	0	0	1.2	1.3	0	0	0	2.5
50. Blended & Pre	0	0	0	0.8	0	0	0	0	0.8
51. Dog, Cat & Pets	0	0	0.1	0.1	1.1	0	1.3	0	2.6
52. Prep Feed NEC	0	0	0	0.7	20.7	0	0	0	21.4
53. Rice Milling	0	0	0	5.7	0	0	0	0	5.7
54. Wet Corn Mill	0	0	0	0.2	8.1	0	0	0	8.3
55. Bread, Cake &	0	0	0	0.2	0.1	0	0	0.1	0.4
57. Sugar	0	0	0	1/	1/	57.4	0	0	57.4
58. Conf & Rel	0	0	0	0	0	0	0.7	1.8	2.5
59. Malt Liquors	0	0	0	0.4	1.5	0	3.2	0	9.1
60. Malt	0	0	0	1/	2.3	0	0	0	2.4
61. Wines, Dist	0	0	0	1/	0.9	0	0	0	1.0
63. Flav Extr &	0	0	0	1/	0	0	0.1	0	0.1
64. Cottonseed Oil	0	0	0	0.1	1/	0	0	0.9	1.0
65. Soybean & Veg	0	0	0	0.3	0.1	0	1.1	42.8	44.6
67. Roasted Coffee	0	0	0	0	0	0	0.1	0	0.1
68. Short., Cook	0	0	0	1/	0	0	0	0.1	0.1
69. Mac. & Spagh.	0	0	0	0.1	0	0	0	0.1	0.2
70. Food Prep NEC	0	0	0	0.1	0	0	4.7	2.0	7.4
72. Fabric & Thread	0	0	0	0	0	0	0.2	0	0.2
91. Paper Mills	0	0	0	0	0.4	0	0	0	0.4
99. Agr. Chemicals	0	0	0	0	0.1	0	0	0	0.1
100. Misc Chemicals	0	0	0	0	0	0	1.5	0	1.5
103. Drugs	0	0	0	0	0.2	0	0.3	0	0.5
104. Clean, Toilet	0	0	0.1	0	0.2	0	0	0	0.3
105. Paints	0	0	0	0	0	0	0	0.4	0.4
174. Other Misc	0	0	0	0	0	0	1.5	0	1.5
177. Truck Tran	0	0	0.3	0	1.6	0	0	0	1.9
193. Real Estate	0	0	0	0	0	0	0.7	0	0.7
200. Eat., Drink	0	0.4	0	0	0	0	0	0	0.4
203. Amuse, Rec	1/	1/	0.6	1/	8.8	1/	1/	0.1	9.5
205. Hospitals	0	0.1	0	0	0	0	0	0	0.1
206. Other Med	0	1/	0	0	0	0	0	0	1/
207. Educ. Serv	0	0	0.1	0	0	0	0	0	0.1
211. Other Fed	0	0	0	0.4	1.1	0	0	0.7	2.1
215. Total Inter	12.6	4.6	6.1	29.3	291.2	61.6	18.1	57.0	480.4
216. Pres Cons Exp.	0.3	2.3	1.9	0	5.2	0	1/	0.5	10.2
218. Chg. Bus Inv	1/	1/	0.2	0.5	4.1	0.3	0.1	0.5	5.5
219. Comp. Exports	0	0.2	0.7	30.0	46.5	11.9	6.8	68.7	164.7
220. Comp Imports	1/	1/	-0.9	1/	-8.7	0	-3.7	1/	-13.4
221. Fed. Govern.	0	0.1	0.1	-17.0	-14.7	0	1/	3.2	-28.3
222. State & Local	0	1/	1/	1/	0.2	0	0	0	0.3
Total Final	0.2	2.6	2.0	13.5	32.6	12.1	3.2	72.9	139.1
223. All Purchases	12.8	7.1	8.1	42.8	323.8	73.8	21.3	129.8	619.6

1/ Based on Table 8 from Minnesota Two-Region Input-Output Computer Model using forecast 1977 U.S. interindustry transactions table in 1972 dollars.

Table 4.3. Imports of Specified Agriculture Industry Output (in 1972 dollars), by Exporting Industry, Minnesota and Rest of Nation, 1977.<sup>1/</sup>

Purchasing In- dustry or Sector No. Title	Meat Animals (3)	Cotton (5)	Grass Seed (8)	Tobacco (9)	Fruits (10)	Tree Nuts (11)	Vege- tables (12)	Forest Prod. (16)	Green- house (17)	For & Fish (18)	Agr, For, & Fish. (19)	Total
					(mil.\$)							
1. Dairy Farm	0	0	0	0	0	0	0	0	0	0	5.8	5.8
2. Poultry & Eggs	0	0	0	0	0	0	0	0	0	0	7.4	7.4
3. Meat Animals	101.6	0	0	0	0	1/	0	1/	0	0	8.5	110.1
4. Misc Livestock	0	0	0	0	0	0	0	0	0	0	0.1	0.1
6. Food Grains	1.1	0	0	0	0	0	0	0	0	0	1.5	2.6
7. Feed Grains	5.6	0	3.0	0	0	0	0	0	0	0	6.7	15.4
8. Grain Seed	0	0	0.1	0	0	0	0	0	0	0	1/	0.1
10. Fruits	0	0	0	0	0	0	0	0	0	0	0.1	0.1
12. Vegetables	1/	0	0	0	0	0	0.1	0	0.3	0	1.7	2.1
13. Sugar Crops	0	0	0	0	0	0	0	0	0	0	1.7	1.7
14. Misc Crops	0	0	0	0	0	0	0	0	1/	0	0.5	0.5
15. Oil-Bearing	0.9	0	0	0	0	0	0	0	0	0	3.3	4.2
17. Greenhouse	0	0	0	0	0	0	0	0	0.4	0	0.2	0.6
18. Forestry & Fish	0	0	0	0	0	0	0	0.1	0	1/	0.1	0.2
19. Agr., For, Fish	0.8	0.7	0.2	0.2	0.5	0.1	1/	0	0.2	0.1	0.8	3.6
27. New Res Bldg	0	0	0.1	0	1/	0	0	0	0.3	1/	0.4	0.8
28. New Nonres	0	0	1/	0	1/	0	0	0	0.1	0	0.1	0.2
36. Meat Packing	235.9	0	0	0	1/	0	0	0	0	0	0	235.9
37. Sausages &	0.1	0	0	0	1/	0	0	0	0	0	0	0.1
43. Ice Cream &	0	0	0	0	0	0.4	0	0	0	0	0	0.4
44. Fluid Milk	1/	0	0	0	1/	0	0	0	0	0	0	0.5
45. Canned Fr & V	0	0	0	0	11.5	0	0.7	0	0.8	1/	0	13.1
46. Froz Fr & Veg.	0	0	0	0	8.3	0	0.3	0	0	0.1	0	6.7
47. Other Pres	0	0	0	0	2.2	0	0.1	0	0	8.0	0	10.3
49. Cereal Prep	0	0	0	0	0	0.6	0	0	0	0	0	0.6
51. Dog, Cat & Pets	0	0	0	0	0	0	0	0	0	0.1	0	0.1
55. Bread, Cake &	0	0	0	0	1/	0.5	0	0	0	0	0	0.5
58. Conf & Rel	0	0	0	0	1/	3.6	0	0	0	0	0	3.6
61. Wines, Dist	0	0	0	0	0.1	0	0	0	0	0	0	0.1
63. Flav Extr &	0	0	0	0	1/	0	0	0	0	0	0	1/
65. Soybean & Veg.	0	1.0	0	0	0	0	0	0	0	0	0	1.0
66. Animal & Mar	0	0	0	0	0	0	0	0	0	0.5	0	0.5
70. Food Prep NEC	0	0	0	0	1.1	0	0.9	0	0	0.1	0	1.3
72. Fabric & Thread	1/	1.0	0	0	0	0	0	0	0	0	0	1.1
74. Misc Textile	0.1	0.1	0	0	0	0	0	0	0	0	0	0.2
75. Hosiery & Knit	0	0.1	0	0	0	0	0	0	0	0	1/	0.1
76. Apparel Mfg	0	0	0	0	0	0	0	0	0	0.2	0	0.2
78. Logging	0	0	0	0	1/	0	0	0.2	0	16.2	1/	16.4
91. Paper Mills	0	0	0	0	1/	0	0	0	1/	0.1	1/	0.1
99. Agr Chemicals	0	0	0	0	0	0	0	0	0	0	1/	1/
100. Mics Chemicals	0	0	0	0	1/	0	0	0	0	0.1	1/	0.1
103. Drugs	0	0	0	0	1/	0	0	0	0	0	0	1/
104. Clean., Toilet	0	0	0	0	1/	0	0	0	0	0	0	1/
105. Paints	0	0	0	0	1/	0	0	0	0	0	0	1/
128. Fabr Metal	0	0	0	0	1/	0	0	0	0	0	0.1	0.1
174. Other Misc	0	0	0	0	1/	0	0	0	1/	1/	1/	1/
177. Truck Tran	0	0	0	0	1/	0	0	0	1/	0	0	1/
182. Comm., etc	0	0	0	0	1/	0	0	0	1/	0	0	1/
184. Elect Util	0	0	0	0	1/	0	0	0	1/	0	0.6	0.6
187. Gas Utilities	0	0	0	0	1/	0	0	0	0.1	1/	0.7	0.8
188. Water & Sanitary	0	0	0	0	1/	0	0	0	1/	1/	0.2	0.3
191. Insurance	0	0	0	0	0	0	0	0	1/	1/	1/	0.1
192. Owner-Occupied	0	0	0.3	0	1/	0	0	0	0	0	4.5	4.8
193. Real Estate	0	0	1/	0	0	0	0	0	0.4	1/	0.7	1.1
194. Hotels, Lodg	0	0	0	0	1/	0	0	0	1/	0	0.1	0.2
200. Eat, Drink	0	0	0	0	1.4	0	0.5	0	1/	4.8	0	5.7
203. Amuse, Rec	0.1	0.1	1/	1/	1/	1/	1/	1/	1/	1/	0.6	0.8
205. Hospitals	0	0	0	0	0.2	0	1/	0	1/	0.1	0.2	0.5
206. Other Med	0	0	0	0	0.1	0	1/	0	1/	1/	1/	0.2
207. Educ Serv	0	0	0	0	1/	0	0	0	0	0	0.3	0.3
208. Nonprof Org.	0	0	0	0	1/	0	0	0	1/	0	0.1	0.2
211. Other Fed	0	0.1	0	0	1/	0	0	0	0	0	0	0.1
213. Other State-Loc	0	0	1/	0	1/	0	0	0	1/	0	1/	0.2
215. Total Inter	346.3	3.1	3.8	0.2	26.2	5.2	2.0	0.3	2.8	30.9	48.5	459.5
216. Pres Cons Exp	0	0	0	0	27.5	2.0	2.7	0	4.0	11.2	1.8	49.2
218. Chg Bus Inv	-1.9	0.2	1/	0.1	0.2	1/	1/	1/	1/	0.6	0	3.2
219. Comp Exports	5.0	33.2	0.4	10.9	14.0	2.8	0.9	1/	1.5	1.3	0.2	70.3
220. Comp. Imports	-1.1	-0.1	-0.2	-3.3	-1.7	-2.4	-0.3	0	-0.2	-16.6	-3.7	-29.2
221. Fed. Govern	0	-0.2	0	0	1/	0	0	0	0	-4.8	1/	5.0
222. State & Local	0	0	0.1	0	0.6	0	0.1	0	0.2	0.2	0.3	1.4
Total Final	5.9	33.2	0.3	7.7	41.1	2.4	3.4	1/	5.6	-8.1	-1.5	99.9
223. All Purchases	352.2	36.2	4.1	7.9	67.3	7.6	5.4	0.4	8.4	22.8	47.1	559.4

<sup>1/</sup> Based on Table 7 from Minnesota Two-Region Input-Output Computer Model using forecast 1977 U S interindustry transactions table in 1972 dollars.

Imports of agriculture industry inputs originate from a variety of rest-of-nation industries, as shown in Table 4.3. Rest-of-nation food products manufacturing industries are important sources of inputs of dairy and livestock farms. Rest-of-nation energy and transportation related industries also are important input sources, along with rest-of-nation marketing-related industries.

#### Food products manufacturing

Food products manufacturing industries account for a large part of total interregional trade between Minnesota and rest of nation industries and economic sectors. In 1977 the total trade volume for the 35 food products manufacturing industries listed in Table 1.1 was more than \$4.5 billion, of which \$2.7 billion was due to exports of the excess supply of manufactured food products, as shown in Table 4.4. Manufactured products exports were 33.6 percent of all exports to rest-of-nation purchasing industries and final demand sectors.

Meat and dairy products accounted for 75 percent of all Minnesota food products exports. Among the nine industries in this two industry group, a deficit supply was estimated for only Industry No. 37 -- Sausages and Other Prepared Meats. Yet, the total imports of intermediate inputs from rest of nation industries for the meat and dairy products industries were only 6.2 percent of all imports. Thus, the meat and food products industries were an important trading asset to Minnesota because of their large positive export trade balances.

Grain products and oil products manufacturing industries also were important in Minnesota's interregional trade. Total exports of the 12 industries in the two industry groups were 5.7 percent of all industry exports while total imports of the outputs of these industries in the rest of nation were 1.3 percent of all imports from rest-of-nation industries.

Table 4.4. Excess Supply and Deficit Supply of Specified Industry Output and Imports of Intermediate Inputs for Specified Industry, Minnesota, 1977. 1/

Industry No. Title	Excess Supply		Deficit Supply		Imports	
	Total	Prop. of All Ind.	Total	Prop. of All Ind.	Total	Prop. of All Ind.
	(thou.\$)	(%)	(thou.\$)	(%)	(thou.\$)	(%)
36. Meat Packing	1,042,481	13.3	0	0	243,415	5.5
37. Sausages & Other	0	0	7,619	0.1	1,635	<u>2/</u>
38. Poultry Dressing	53,717	0.7	0	0	2,094	<u>2/</u>
39. Poultry & Eggs	47,588	0.6	0	0	1,149	<u>2/</u>
40. Creamery Butter	197,729	2.5	0	0	2,462	0.1
41. Cheese, Nat &	181,035	2.3	0	0	9,156	0.2
42. Cond. & Evap.	86,196	1.1	0	0	6,546	0.1
43. Ice Cream	54,493	0.7	0	0	4,027	0.1
44. Fluid Milk	306,218	3.9	0	0	13,842	0.3
45. Can. Fr. & Veg.	136,515	1.7	0	0	31,181	0.7
46. Froz. Fr. & Veg.	41,311	0.5	0	0	16,196	0.4
47. Other Pres. Fr. & V.	0	0	39,578	0.5	17,068	0.4
48. Flour & Other Gr.	212,637	2.7	0	0	7,997	0.2
49. Cereal Prep.	35,497	0.4	0	0	4,329	0.1
50. Blended & Prep.	7,261	0.1	0	0	1,996	<u>2/</u>
51. Dog, Cat, Other	0	0	806	<u>2/</u>	1,253	<u>2/</u>
52. Prep. Feeds NEC	0	0	78,803	1.0	31,412	0.7
53. Rice Milling	0	0	11,949	0.2	185	<u>2/</u>
54. Wet Corn Milling	0	0	21,820	0.3	42	<u>2/</u>
55. Bread, Cake & Roll	0	0	11,969	0.2	6,450	0.1
56. Cookies & Crackers	0	0	17,398	0.2	1,094	<u>2/</u>
57. Sugar	0	0	7,381	0.1	4,178	0.1
58. Confect. & Rel.	10,650	0.1	0	0	12,503	0.3
59. Malt Liquor	7,970	0.1	0	0	9,655	0.2
60. Nakt	35,835	0.5	0	0	382	<u>2/</u>
61. Wines, Dist.	0	0	122,074	1.6	701	<u>2/</u>
62. Soft Drinks	18,100	0.2	0	0	14,897	0.3
63. Flav., Extr.	3,805	<u>2/</u>	0	0	3,871	0.1
64. Cottonseed Oil	0	0	13,213	0.2	0	0
65. Soybean & Veg. Oil	172,800	2.2	0	0	12,519	0.3
66. Animal & Mar. Fats	0	0	3,983	0.1	1,799	<u>2/</u>
67. Roasted Coffee	0	0	14,784	0.2	12,551	0.3
68. Short. & Cook. Oil	0	0	21,757	0.3	3,391	0.1
69. Macaroni & Spagh.	3,289	<u>2/</u>	0	0	394	<u>2/</u>
70. Food Prep. NEC	881	<u>2/</u>	0	0	11,531	0.2
Total	2,656,008	33.6	373,134	5.0	467,402	10.5

1/ Based on Tables 6, 7, and 8 from Minnesota Two-Region Input-Output Computer Model using forecast 1977 U.S. interindustry transactions table in 1972 dollars.

2/ 0.05 percent or less.

Included among these imports are both intermediate inputs and final purchases. The imports of only intermediate inputs were 1.3 percent, also, of all imports of intermediate inputs from rest-of-nation industries. The 12 grain and oil products industries thus contributed to a large positive Minnesota export trade balance.

While food products imports are largely products which are not produced on Minnesota farms, for example, cottonseed and coffee, many food products imports are also produced in Minnesota but less than total requirements. A variety of grain and cereal products, for example, are included in this category. Generally, however, the food products manufacturing industries are closely linked to corresponding agricultural industries. Proximity to agricultural products remains an important location factor for much of Minnesota food products manufacturing.

#### Gross State Product

Economic importance of agriculture-related industry in the Minnesota economy is represented, finally, by its contribution to gross state product. This contribution is measured in 1972 dollars by total value added and value added per worker in each agriculture-related industry. In this section, the 1977 Minnesota interindustry transactions data are supplemented by additional U.S. data on gross national product originating in the agriculture sector of the U.S. economy. The Minnesota agriculture value added data are adjusted to the U.S. totals.

#### Value Added

Total value added by the eight livestock and crop agriculture industries was over \$2 billion (when adjusted to 1977 inventory levels). The forest and fisheries products industry and the agricultural, forest and fisheries industries accounted for an additional \$38.5 million of value

added -- a total value added of \$2,054,483,000 billion for the 10 agricultural industries, as shown in Table 5.1.

The nine food products manufacturing industries contributed about half the total value added contributed by the 10 agricultural industries. However, total employment in the nine food products manufacturing industries was less than a third of the total employment in the 10 agriculture industries. Thus, value added per worker was nearly two-thirds more (\$20,426 as compared with \$12,606) in food products manufacturing than in agriculture.

Both total value added and value added per worker varied widely among individual agriculture-related industries -- from \$2,999 in the poultry and egg farm enterprise to \$36,133 in the forest and fisheries products industry and \$32,419 in the grain milling industry. These comparisons mask real differences in industry organization and structure.

Employment in the eight agriculture commodity-producing industries is based on the labor requirements of the 17 commodity-producing industries in the 214-industry input-output tables. The initial estimates of industry labor requirements for Minnesota were adjusted to U.S. control totals. Employment in food products manufacturing is based on published data sources of the U.S. Department of Commerce, and the Minnesota Department of Employment Security. Reconciliation of employment and value added estimates based on several data sources, while not attempted here, is discussed in related reports (1,2,6,7).

#### Final product

An alternate approach to the estimation of gross state product is by estimation of the final product purchased and produced in the state. In 1977, the Minnesota final product was \$23.9 billion, or \$1.3 billion less than the total value added of \$25.2 billion.

Comparison of value added and final product estimates is based on the income and product identity, namely, that value added equals final product



Table 5.1. Employment and Value Added (in 1972 Dollars) in Specified Industry, Minnesota, 1977.

Industry No. Title	Employ- ment <sup>1/</sup> (no.)	Value Added	
		Total (thou.dol.)	Per Worker (dol.)
1. Dairy Farm	25,025	259,801	10,382
2. Poul., Eggs	6,488	19,457	2,999
3. Meat An.	22,200	218,291	9,833
4. Food, Feed	63,337	1,098,626	17,346
5. Vegetables	4,678	64,497	13,787
6. Sugar Crop	3,707	53,953	10,569
7. Oil-Bearin	24,849	262,633	6,384
8. Other Crop	6,444	36,062	5,596
9. For., Fish.	150	5,147	36,133
10. Agr., For.,	6,760	33,336	4,931
11. Mining	12,818	230,119	17,953
12. Constructi	81,433	1,359,381	16,693
13. Meat Produ	17,477	237,119	13,582
14. Dairy Prod	9,601	247,400	25,768
15. Fruit & Ve	5,278	125,501	23,778
16. Grain Mill	4,520	146,543	32,419
17. Bakery	3,160	68,089	21,547
18. Sugar Prod	2,259	52,258	23,133
19. Soybean, V	1,576	31,386	19,915
20. Alch. Bev.	4,916	127,332	25,902
21. Misc. Food	1,926	33,909	17,606
22. Chem. & Al	6,314	193,687	30,677
23. Petr. Ref.	2,642	93,441	56,907
24. Farm Mach.	5,207	89,817	17,249
25. Other Mfg.	279,938	4,001,465	14,294
26. Transporta	64,955	1,064,623	16,385
27. Comm., Uti	32,477	1,072,095	33,011
28. Wh. & Ret.	451,444	4,255,725	9,427
29. Fin., Ins.,	88,655	3,979,315	44,885
30. Services	385,698	3,126,426	8,106
31. Gov't Ent.	21,283	222,658	10,462
32. Other Gov't.	280,698	2,370,138	8,443
33. Total or Average	1,926,251	25,192,202	13,078
Farm (1-10)	162,976	2,054,483	12,606
Food Prod (13-21)	50,713	1,035,875	20,426

<sup>1/</sup> Major industry totals are based on unpublished data from U.S. Dept. Commerce, Regional Economic Information System, Washington, D.C., 1980. Agricultural employment is based on U.S. Bureau of Labor Statistics, Bulletin 2030, 1979; and U.S. Dept. Agr., State Farm Income Statistics, Supplement to Statistical Bulletin No. 627, 1980. Non-agricultural employment is based on supplemental data in County Business Patterns, 1977, and periodic reports of Minnesota Department of Employment Security and Minnesota Department of Economic Development.

plus net exports. This comparison is presented in Table 5.2, where total value added by the first 31 industries in Table 5.1 is supplemented by the value added by government and by certain value added adjustments. These adjustments include the employee compensation of paid household workers, inventory valuation, and Minnesota pro-rata share of rest-of-world transfers.

The 1977 gross state product of Minnesota (in 1972 dollars) is represented numerically by substitution of the entries in Table 5.2 into the two forms,

$$\text{GSP} = \text{TVA} = 22,822,064 + 2,673,691 \quad (5.1)$$

and,

$$\text{GSP} = \text{TFP} + (\text{EXP} - \text{IMP}) = 24,605,461 + (8,999,801 - 8,109,507) \quad (5.2)$$

The numerical substitution yields a gross state product of \$25,495,755.

The 54 agriculture-related industries thus contributed a total value added equivalent to 12.1 percent of gross state product.

The \$25.5 billion 1977 gross state product compares with a 1972 gross state product of \$20.9, as estimated (also in 1972 dollars) in a related report (7). Total value added by agriculture and food products manufacturing in 1972 was \$2.2 billion, or 10.5 percent of gross state product. Adjusted value added comparisons for the two years are as follows:

<u>Industry</u>	<u>1972</u> (mil.\$)	<u>1977</u> (mil.\$)	<u>Increase,</u> <u>1972-1977</u> (%)
Agriculture	1,423	2,054	44
Food Products Mfg.	778	1,036	33
Other Industry	<u>16,759</u>	<u>19,775</u>	<u>18</u>
All Industry	18,960	22,865	20
Gross State Product	20,875	25,457	22

Again, accurate comparison of individual industries, and even large industry groups, is difficult because of computational procedures. Much of the

Table 5.2. Product disbursements and income receipts (in 1972 dollars) of specified producing sector, by final product and export sector, Minnesota, 1977.

Income Receiving Sector	Inter-mediate	Local				Rest of Nation					Total Disbursements
		Personal Consumption Expenditure	Gross Private Capital Formation	Change in Bus. Invent.	Government		Exports	Imports	Other Exports		
					Federal	State & Local				Total	
Intermediate	18,572,906	13,095,742	3,075,225	702,256 <sup>2/</sup>	339,553	1,262,363	13,475,138	1,629,199 <sup>2/</sup>	-725,644 <sup>2/</sup>	7,903,450	45,810,049
Dummy Industry:											
Government	0	0	0	0	371,762 <sup>1/</sup>	1,998,376 <sup>1/</sup>	2,370,138	0	0	0	2,370,138
ROW	0	0	0	0	0	0	0	539,224	-118,217	0	421,007
Household	0	105,885	0	0	0	0	105,885	0	0	0	105,885
Inventory	0	0	0	-233,339	0 <sup>1/</sup>	0 <sup>1/</sup>	-233,339	0	0	0	-223,339
Total	0	105,885	0	-233,339	371,762 <sup>1/</sup>	1,998,376 <sup>1/</sup>	2,252,684	539,224	-118,217	0	2,673,691
Value Added	22,822,064	0	0	0	0	0	0	0	0	0	22,822,064
Imports:											
Noncomparable	84,986	113,762	0	-340	29,803	0	143,225	42,772	-270,983	0	0
Other	4,375,093	2,224,612	714,421	101,289	155,868	538,224	3,734,414	0	0	0	8,109,507
All Purchases	45 810,049	15,540,001	3,789,646	702,255	896,986	3,798,963	24,605,461	2,211,195	-1,114,844	7,903,450	79,415,311

1/ Directly estimated from unpublished data, U.S. Department of Commerce, Regional Economic Information System, 1980.

2/ Recomputed from control totals for allocated U.S. exports and imports and change in business inventories.

1972 to 1977 increase in total value added in agriculture, for example, was due to large increases in farm crop inventories. Actual money flow, or cash income in constant dollars, increased much less than the derived value added.

#### References Cited

1. Hwang, Henry H. and Wilbur R. Maki. Users' Guide to the Minnesota Two-Region Input-Output Model. Staff Paper Series P79-34. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. September 1979.
2. Maki, Wilbur R., Patrick D. Meagher and Leonard A. Laulainen, Jr. Users' Guide to the Minnesota Regional Development Simulation Laboratory. Staff Paper Series P79-28. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. July 1979.
3. Maki, Wilbur R., Gregory H. Michaels, Leonard A. Laulainen, Jr. and Mason Chen. Employment Trends and Projections for Minnesota and Its Substate Development Regions. Station Bulletin 531, Agr. Exp. Sta., University of Minnesota, St. Paul. 1979.
4. Maki, Wilbur R. Income Trends and Projections for Minnesota and Substate Development Regions. Station Bulletin 537, Agr. Exp. Sta., University of Minnesota, St. Paul. 1980.
5. Maki, Wilbur R. Regional Input-Output and Social Accounting Systems for Agricultural and Rural Development Planning. Staff Paper Series P80-21. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. September 1980.
6. Maki, Wilbur R., Peter L. Stenberg and Mason Chen. Economic Importance of Export-Producing Industry in Minneapolis-St. Paul Metropolitan Area. Staff Paper Series P80-29. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. December 1980.
7. Maki, Wilbur R., Peter L. Stenberg and Mason Chen. Economic Importance of Export-Producing Industry in Minnesota. Staff Paper Series P81-3. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. January 1981.
8. Ritz, Philip M., Eugene P. Roberts, and Paula G. Young. Dollar Values for the 1972 Input-Output Study. Survey of Current Business 59(4): 51-72. April 1979.
9. U.S. Bureau of Labor Statistics. Employment Projections for the 1980's, Bulletin 2030. U.S. Government Printing Office, Washington, D.C., 1979.