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# ESTIMATING THE ECONOMIC IMPACTS FROM AN EXPANDED WAFERBOARD INDUSTRY IN NORTHEASTERN MINNESOTA

by

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## INTRODUCTION & JUSTIFICATION FOR RESEARCH

Northeastern Minnesota's economy is often characterized as consisting of the five T's: Taconite, Timber, Tourism, Trade, and Transportation. Together these sectors account for major influences on the region's economic development and prosperity. Individually, however, they are a very diverse group and have different impacts on the region's economic performance.

This study concentrates on the timber and forest products industry in the seven counties of Northeast Minnesota which make up Region 3; namely, Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis Counties. In particular, it focuses on the economic impacts resulting from an expanded waferboard/orientated strand board industry within the region.

Waferboard and OSB are two of the more important "new generation" structural panels that have entered the building panel market significantly in recent years. These new panels are made of chipped (waferboard) or stranded and oriented fibers (OSB) bonded by resin which can be produced from lower valued tree species, with less labor and at locations nearer to markets than plywood. Though the first plant was constructed in 1958 rapid growth in the last six years have seen the number of these plants in the U. S. and Canada increase from eight in 1978 to twenty-four in 1983. Estimates indicate the industry's output will increase from 3.1 billion square feet (3/8 inch basis)to 8 billion square feet in the next 15-20 years in the U. S. and Canada [4].

The very rapid acceptance in the market place is due in part to the marketing efforts of these companies, demands for lower priced products, and the ability for waferboard to compete favorably in almost all the end uses of plywood. Primary factors which influence the future of this industry in Northeast Minnesota, other regions of the country, and Canada are: 1) the ability of waferboard/OSB to continue penetrating the plywood markets; 2) market location in relation to available wood resources; and 3) the type of species

available. For the purposes of clarity, this report will refer to both of these industries simply as waferboard.

From a standpont of species availability the region of Northeast Minnesota and in particular the high unemployment areas of the Range and North Shore have a supply of the most desired species for these products, aspen. The plants which are presently operating in the region use approximately 270,000 cords per year total. Current estimates by the Minnesota Department of Natural Resources indicate that at least one new plant and, if located properly, more than one, can be located in Minnesota.

An important factor for the success of waferboard in the Arrowhead region will be the ability of the Minnesota industry to compete favorably with other regions. Waferboard plants are coming into production in the southern parts of the U. S.; however, inherent characteristics of the raw materials available in these areas result in heavier and lower quality boards with higher overall production costs. As the construction industry continues its recovery and as demand increases, the waferboard industry will undoubtedly continue growing.

It is this rapid growth in the waferboard industry, combined with the difficulty of isolating data that makes the industries' impact on Minnesota uncertain. Therefore, it is necessary to develop an acceptable procedure capable of estimating and analyzing the impacts which will undoubtedly arise as this new industry expands and grows within Northeast Minnesota. The remainder of this paper will deal with the development and actual implementation of a large scale input/output simulation model known as SIMLAB; and the process through which a highly sophisticated impact analysis can be made.

First, problems encountered in procuring data will be discussed, followed by a presentation of the structures and features of SIMLAB. Finally, the

results of the simulations and implications to be drawn from them will be discussed.

OBJECTIVES

The purpose of this work is to: 1) summarize the results of a simulation project being conducted at the University of Minnesota, Duluth which employs a large scale, input-output based, computerized model to project the effects of assumed levels of production in the waferboard industry in northeast Minnesota to the year 2000, and 2) present a detailed description of the model itself.

The simulation model (named SIMLAB) used for this project was developed at the University of Minnesota, St. Paul campus, primarily by Wilbur Maki, Professor of Agriculture and Applied Economics. Professor Maki, et.al, have completed a series of reports based on SIMLAB which simulate developments in various industrial sectors in Minnesota into the future [3], [6], and [8].

Other works have also employed the Maki model as it gains increasing familiarity and acceptance in the field. Erkkila, Rose, and Lundgren used the model to project the impact of expanded timber-based industry activity in northeast Minnesota [2]. Their results showed that increased activity could be supported by the Arrowhead regional economy, which served to demonstrate one of SIMLAB's uses.

Finally, an earlier version of this report used the SIMLAB model for the State of Minnesota to estimate alternative futures from potential particleboard/waferboard development [5]. The current report builds on this earlier effort and makes the necessary modifications to access the Northeast Minnesota SIMLAB program. Unlike the State program, the Northeast Minnesota program separates particleboard/waferboard from other wood products allowing for more detailed impact estimations.

## DATA PROBLEMS

Interpretable information on the waferboard industry is difficult to find. The first problem is in the compilation of statistics under the categories of particleboard and structural building panels. Waferboard is a type of particleboard and is a structural building panel. Much particleboard is not structural. Statistics on particleboard don't generally break out the waferboard element. Likewise, statistics on structural building panels generally don't distinguish among plywood, waferboard and other types of building panels.

Even using the Standard Industrial Classification Code (SIC) doesn't add clarification because different compilers of statistics have different interpretations. One source places waferboard under SIC 2499, along with lathes, railroad ties, and redwood planters, while particleboard is listed under SIC 2492.

Interpretation of trends in the waferboard industry disclose further problems. Different sources use different categories of end use of particleboard and different time frames for estimates. Couple these problems with different measurement bases of consumption, and it is very difficult to trace a prior year's estimates from one source to current year's actual figures from another.

SIMLAB lumps particleboard and waferboard into one industry. Thus, this paper will be reporting the trends in waferboard production under particleboard as a generic title. The multipliers for the two are assumed to be the same when taking this approach. The purchase patterns of the two industries are probably similar enough to warrent such an assumption, however.

## THE SIMLAB SYSTEM

The most complete guide to the structure and use of SIMLAB is contained in USER'S GUIDE TO THE MINNESOTA REGIONAL DEVELOPMENT SIMULATION LABORATORY, by

Wilbur R. Maki and others [7]. This guide is not current in terms of the updated version of SIMLAB (updated from a base year 1970 to a base year 1977) or for the changes in SIMLAB as it now relates to northeast Minnesota. A more current guide is planned for publication during late 1983 or early 1984.

The description of the SIMLAB system here will rely heavily on the older version of the USER'S MANUAL. However, any changes in the model that are particularly relevant to this work will be incorporated into this description.

SIMLAB is a user interactive computer based simulation model. Since the first operational system was developed by Wilbur Maki and others for the State of Minnesota in 1970, it has been expanded to include additional industries, additional modules and to relate to additional planning regions in the state. SIMLAB is now available for the state as a whole and for the Headwaters and Arrowhead planning regions.

SIMLAB is a series of nine modules. Each module is interactive with the others in the system. In other words, the output of one module becomes input to other modules in the system. The production module is central to the system. It links the regional or state economy to the rest of the nation. This module's core is made up of a regional input-output system reduced from a larger set of tables comprising a 214 sector two region system constructed from secondary information. The elements of input-output are reviewed in Appendix I of this report. The production module for northeast Minnesota is composed of seventy-five sectors, all classified in terms of SIC definitions.

Eight other modules interact with the production module to make up the system:

The investment module links private spending for plant and equipment to the gross output of capital producing industries in the region. Thus, investment in the region is related to the output estimates obtained from the interaction between the market and the production modules.

The demand module links final users of goods and services in the region with the gross output of the region's industrial sectors. The link is also carried out through the region's imports from the rest of the nation.

The market module links the region's economic activity to the rest of the nation's. This is accomplished through regional market share ratios, which are ratios of regional export activity to total activity in the rest of the country. The market module drives the system by predicting regional activity from assumed national growth rates in specified industrial groupings.

The government module links federal, state and local governmental economic activities to the production module.

The employment module links gross output levels to regional employment by industry and by skill category. This is accomplished through a series of output employment ratios of the type commonly used in input-output analysis.

The population module includes standard demographic measures such as birth rates, death rates and computed rates of migration. The migration computation is related to the employment and labor force modules. Out of these two modules, levels and rates of change in levels of unemployment are computed based on the projected changes in gross output from the market and production modules. Increasing unemployment leads to out-commuting at first, and later to out-migration of population. Decreasing rates of unemployment have the opposite effect.

The primary input module links gross output with depreciation, business taxes and profits in the region. This is consistent with the definitions used in the construction of the national input-output system.

The household module links population estimates by age of the head of household to the stock of owner and renter occupied dwelling units. This link

is carried forward to two sets of characteristics of the dwelling unit; indoor plumbing and persons per room as indications of housing quality demanded in the region.

Although the use of econometric forecasting techniques for projecting national or regional output levels is compatable with the SIMLAB system, it should be pointed out that SIMLAB itself is not based on stochastic techniques and is not, therefore, capable of being evaluated in terms of confidence intervals and probability theory. Rather, the accuracy of the results is evaluated in terms of consistency between module outputs.

For example, if a projected level of gross output is of such a high level that the capital stock of the region is incapable of accommodating such an increase, the SIMLAB system will show the region importing its additional production needs from the rest of the nation. This means that the SIMLAB system will flag impossible production levels for the user by indicating insufficient capacity.

Similarly, if production is shown to be increasing at a faster rate than would be warranted by current population, labor force and labor productivity measures, inmigration will be shown to occur, warning the user of potential inconsistencies in projected results. The system is, first and foremost, a simulation system. Its only requirement in terms of accuracy is that the user be able to logically explain the results. This logical explanation must relate to the outputs of all of the modules in the system, thus, the requirement of consistency in explained outcomes.

The SIMLAB system has one other feature of some interest. It is interactive with the user. Once the system is accessed, the user works with the system through a series of questions and user responses. The system can print out on remote terminal paper, or it can be forwarded to high speed printers with

additional, relatively simple computer commands. As such, "It extends the use of available information on regional economic conditions to a much wider range of user clientele than simply the technicians and analysts working on environmental and economic impact studies." [7]. The model being used here was constructed under a series of cooperative agreements between the University of Minnesota and the North Central Forest Experiment Station, U. S. Forest Service. The household module was funded by the University of Minnesota Center for Urban and Regional Affairs. Finally, this report and publication was funded by the UMD Natural Resource Research Institute which also provided funds for the system's maintenance and expansion.

## THE CONCEPT OF THE BASELINE AND BASELINE RUNS

The first step in using the SIMLAB model is to run a baseline projection series. This series includes several identified rates of growth for seventy-five industrial sectors at the national level, along with levels of labor productivity, levels of local investment (both capacity increasing investment and pollution abatement investment), labor force participation rates, and other parameters reflecting economic and demographic behavior for the region.

These parameters of the system are used to calculate variable values in a series of eleven tables that can be accessed through the SIMLAB system. The titles of the eleven tables are summarized in Table 1. The titles reflect the information contained in each of these tables. The user may access one or all of the tables through the process of answering questions through the user interactive program.

This paper will emphasize the information contained in the first and the sixth table of this series. The first table, titled Export Market Indicators of Specified Industries, reflects the link between industries in the region being

studied and the rest of the nation. It should be emphasized at this point that the rest of the nation does exclude all activity in the region being studied with the exception of the region's exports. In other words, the region's exports appear as a part of the output of the rest of the nation. The result is as follows: when the output of the nation increases, the region's output, in the form of exports, is assumed to increase at a ratioed level. This increase, of course, will also be reflected in increased local employment, investment, etc., that appear in the remaining tables.

The Export Market Indicators that appear in the first year for the simulation (the base year of the program) appear in Table 2. In that table, the gross output for the United States and the region appear in the first two columns. The gross output, in the parlence of interindustry analysis, represents the sales by industries to one another plus sales to final demand (household consumption, various types of investment, various levels of government spending and net exports). This bit of explanation is required to point out that the gross output will be larger than the more familiar measures of gross national or gross regional product due to the fact that double counting takes place. The value of output for firms selling intermediate and semifinished products is added to the value of final outputs.

In addition to gross outputs, the indicators table includes the level of regional exports and the percent of national output those exports represent. This percentage figure is not the percentage of national output that is represented by total regional output, but rather, the percent of U.S. output that is made up by the region's exports.

Table 1: DATA BASE TABLES IN SIMLAB

| Table Number | Table Titles |
|---|---|
| 1 | Export Market Indicators of Specified Industries |
| 2 | Intermediate and Local Final Demand Indicators of Specified Industries |
| 3 | Investment and Capital Stock Indicators of Specified Industries |
| 4 | Intermediate Purchasers, Imports, and Value Added Indicators of Specified Industries |
| 5 | Output, Earnings, and Employee Compensation Per Worker For Specified Industries |
| 6 | Total Employment in Specified Industries, By Occupation |
| 7 | Total Population and Labor Force Indicators of Specified Sex and Age Class |
| 8 | Productivity Indicators of Specified Industries |
| 9A | Head of Household by Age |
| 9B | Persons Per Room by Occupancy Status |
| 9C | Occupancy Status by Plumbing Facilities |

TABLE 2 EXPORT MARKET INDICATORS OF SPECIFIED INDUSTRIES
ARROWHEAD , 1977

| INDUSTRY NO. | TITLE | GROSS OUTPUT: UNITED STATES | GROSS OUTPUT: TOTAL REGION | ACTUAL MARKET SHARE: REGIONAL EXPORT | ACTUAL MARKET SHARE: PERCENT OF U.S. GROSS OUTPUT | ACTUAL MARKET SHARE: ANNUAL CHANGE | POTENTIAL MARKET SHARE: EXPORTS | POTENTIAL MARKET SHARE: PERCENT OF U.S. GROSS OUTPUT |
|---|---|---|---|---|---|---|---|---|
| | | (10'S OF THOU) | (HUND) | (HUND) | (PERCENT) | (PERCENT) | (HUND) | (PERCENT) |
| 1 | DAIRY & PO | 197151. | 203660. | 990. | .0005 | 0.0000 | 0. | 0.0000 |
| 2 | MEAT AN. & | 380590. | 177220. | 610. | .0002 | 0.0000 | 0. | 0.0000 |
| 3 | FOOD, FEED | 286350. | 54340. | 17150. | .0060 | 0.0000 | 0. | 0.0000 |
| 4 | OTHER CROP | 318800. | 32900. | 5210. | .0016 | 0.0000 | 0. | 0.0000 |
| 5 | FOREST., F | 38070. | 27040. | 500. | .0013 | 0.0000 | 0. | 0.0000 |
| 6 | AGR.,FOR., | 60140. | 39200. | 300. | .0005 | 0.0000 | 0. | 0.0000 |
| 7 | IRON & FER | 21390. | 9060370. | 8936930. | 41.7809 | 0.0000 | 8935112. | 41.7724 |
| 8 | NONFERROUS | 34120. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 9 | COAL & PEA | 162910. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 10 | STONE,CLAY | 36780. | 40910. | 370. | .0010 | 0.0000 | 0. | 0.0000 |
| 11 | OTHER MINI | 492830. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 12 | NEW CONSTR | 1782096. | 5036750. | 1734250. | .0973 | 0.0000 | 1734051. | .0973 |
| 13 | MAIN. & RE | 624344. | 1122130. | 120. | .0000 | 0.0000 | 0. | 0.0000 |
| 14 | ORDNANCE | 85720. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 15 | MEAT PRODU | 473960. | 1875700. | 1022410. | .2157 | 0.0000 | 1001425. | .2113 |
| 16 | DAIRY PROD | 243220. | 945880. | 672760. | .2766 | 0.0000 | 671163. | .2759 |
| 17 | CANNED,FRO | 223380. | 946270. | 813440. | .3642 | 0.0000 | 807365. | .3614 |
| 18 | GRAIN MILL | 236840. | 75770. | 12710. | .0054 | 0.0000 | 1779. | .0008 |
| 19 | BAKERY PRO | 129620. | 201210. | 18190. | .0140 | 0.0000 | 17506. | .0135 |
| 20 | ALCH. BEV. | 292680. | 431330. | 311830. | .1065 | 0.0000 | 309977. | .1059 |
| 21 | MISC. FOOD | 503060. | 132480. | 4530. | .0009 | 0.0000 | 0. | 0.0000 |
| 22 | TEXTILE GO | 364970. | 73620. | 40750. | .0112 | 0.0000 | 38278. | .0105 |
| 23 | APPAREL, F | 485490. | 482040. | 166450. | .0343 | 0.0000 | 158207. | .0326 |
| 24 | LOGGING | 111440. | 686160. | 87380. | .0784 | 0.0000 | 75069. | .0674 |
| 25 | SAWMILLS | 115210. | 223380. | 22450. | .0195 | 0.0000 | 16844. | .0146 |
| 26 | PARTICLEBO | 5097. | 25790. | 17110. | .3357 | 0.0000 | 16976. | .3330 |
| 27 | OTHER WOOD | 176233. | 590480. | 374130. | .2123 | 0.0000 | 370842. | .2104 |
| 28 | FURNITURE | 168550. | 35520. | 580. | .0003 | 0.0000 | 207. | .0001 |
| 29 | PULP & PAP | 376880. | 4427360. | 4182190. | 1.1097 | 0.0000 | 4174176. | 1.1076 |
| 30 | PAPERBOARD | 131360. | 80750. | 620. | .0005 | 0.0000 | 0. | 0.0000 |
| 31 | PRINTING & | 487810. | 546710. | 63640. | .0130 | 0.0000 | 54152. | .0111 |
| 32 | CHEM. & AL | 1103330. | 547470. | 233100. | .0211 | 0.0000 | 203984. | .0185 |
| 33 | PETR. REF. | 1075310. | 2362480. | 416640. | .0387 | 0.0000 | 361724. | .0336 |
| 34 | RUBBER PRO | 351560. | 80400. | 3640. | .0010 | 0.0000 | 0. | 0.0000 |
| 35 | LEATHER PR | 75740. | 1620. | 30. | .0000 | 0.0000 | 0. | 0.0000 |
| 36 | GLASS, STO | 336890. | 647980. | 318780. | .0946 | 0.0000 | 312742. | .0928 |
| 37 | PRIMARY FE | 502030. | 371950. | 9220. | .0018 | 0.0000 | 0. | 0.0000 |
| 38 | IRON & STE | 149160. | 163430. | 38890. | .0261 | 0.0000 | 36868. | .0247 |
| 39 | PRIMARY CO | 154990. | 3950. | 170. | .0001 | 0.0000 | 0. | 0.0000 |
| 40 | OTHER PRIM | 259160. | 48150. | 5890. | .0023 | 0.0000 | 0. | 0.0000 |
| 41 | FABRICATED | 797760. | 518190. | 217190. | .0272 | 0.0000 | 194981. | .0244 |
| 42 | FARM MACHI | 115790. | 267110. | 95860. | .0828 | 0.0000 | 73776. | .0637 |
| 43 | MACHINE SH | 79060. | 30170. | 1370. | .0017 | 0.0000 | 0. | 0.0000 |
| 44 | OTHER NON. | 694560. | 742160. | 175310. | .0252 | 0.0000 | 92856. | .0134 |
| 45 | COMP., OFF | 165680. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 46 | SERV. IND. | 120080. | 42480. | 5060. | .0042 | 0.0000 | 0. | 0.0000 |
| 47 | ELECTRICAL | 879740. | 56790. | 5270. | .0006 | 0.0000 | 0. | 0.0000 |
| 48 | MOTOR VEHI | 1194340. | 90620. | 6980. | .0006 | 0.0000 | 0. | 0.0000 |
| 49 | OTHER TRAN | 490230. | 4130. | 280. | .0001 | 0.0000 | 0. | 0.0000 |
| 50 | PROF., SCI | 131460. | 4150. | 270. | .0002 | 0.0000 | 0. | 0.0000 |
| 51 | OPTICAL, O | 119070. | 37730. | 6720. | .0056 | 0.0000 | 2495. | .0021 |
| 52 | MISC. MFG. | 185890. | 217590. | 64230. | .0346 | 0.0000 | 56144. | .0302 |
| 53 | RAILROAD T | 216750. | 1313450. | 887170. | .4093 | 0.0000 | 861930. | .3977 |
| 54 | LOCAL TRAN | 86850. | 53000. | 50. | .0001 | 0.0000 | 0. | 0.0000 |
| 55 | TRUCK TRAN | 431090. | 258340. | 8160. | .0019 | 0.0000 | 0. | 0.0000 |
| 56 | AIR TRANS. | 236630. | 75670. | 6950. | .0029 | 0.0000 | 0. | 0.0000 |
| 57 | OTHER TRAN | 193680. | 169280. | 38490. | .0199 | 0.0000 | 0. | 0.0000 |
| 58 | COMMUNICAT | 575820. | 637060. | 67160. | .0117 | 0.0000 | 58734. | .0102 |
| 59 | ELECTRIC U | 562099. | 1490250. | 246480. | .0438 | 0.0000 | 245508. | .0437 |
| 60 | GAS UTILIT | 363700. | 669730. | 1720. | .0005 | 0.0000 | 0. | 0.0000 |
| 61 | WATER & SA | 45430. | 146220. | 48270. | .1063 | 0.0000 | 48146. | .1060 |
| 62 | WHOLESALE | 1685770. | 1906600. | 124520. | .0074 | 0.0000 | 0. | 0.0000 |
| 63 | RETAIL TRA | 1794770. | 3029260. | 545970. | .0304 | 0.0000 | 543277. | .0303 |
| 64 | FINANCE, I | 1273090. | 1009220. | 2780. | .0002 | 0.0000 | 0. | 0.0000 |
| 65 | REAL ESTAT | 2796966. | 3935370. | 22060. | .0008 | 0.0000 | 0. | 0.0000 |
| 66 | HOTELS, PE | 425633. | 648040. | 143020. | .0336 | 0.0000 | 142796. | .0335 |
| 67 | BUSINESS S | 1254490. | 920120. | 12330. | .0010 | 0.0000 | 0. | 0.0000 |
| 68 | EAT.&DRINK | 809310. | 1286940. | 272500. | .0337 | 0.0000 | 272503. | .0337 |
| 69 | AUTOMOBILE | 437390. | 468080. | 60. | .0000 | 0.0000 | 0. | 0.0000 |
| 70 | MOTION PIC | 230020. | 133170. | 4790. | .0021 | 0.0000 | 0. | 0.0000 |
| 71 | HEALTH SER | 1123180. | 2052100. | 453950. | .0404 | 0.0000 | 453922. | .0404 |
| 72 | EDUC., NON | 460759. | 495600. | 53380. | .0116 | 0.0000 | 51978. | .0113 |
| 73 | FED. GOV'T | 195000. | 207370. | 1900. | .0010 | 0.0000 | 0. | 0.0000 |
| 74 | STATE & LO | 200141. | 350640. | 2530. | .0013 | 0.0000 | 0. | 0.0000 |
| 75 | SCRAP, USE | 29604. | 2791320. | 14040. | .0474 | 0.0000 | 0. | 0.0000 |
| | TOTAL | 33457093. | 57860550. | 23070780. | .0069 | 0.0000 | 22397489. | .0067 |

The annual change column of this table will have zeros in the base year. This calculated value only begins to take on meaning as several years are included in the simulation.

All of these export and percentage figures are included under two super-categories, "Actual" and "Potential" market shares. The actual market share, as the name implies, represents figures calculated for the years in question. Potential market share represents the production that would take place in the region in the absence of any capacity constraints.

Table 3 is actually taken from the sixth title in the series appearing in Table 1. This is the unemployment and employment information for the seventy-five sector grouping for the region being analyzed. The employment information is given as a total and by occupation classification for each of the seventy-five industries.

Tables 2 and 3 reflect the base information in the system for export market indicators and employment. As was mentioned earlier, several rates are also included in the system reflecting the parameters to the system. One series of such rates are a matrix of growth rates, on a national level, for the seventy-five sectors. All of the parameter information in the SIMLAB system for northeast Minnesota were collected from secondary data sources. This does not preclude the inclusion of primary data in the future, as warranted.

The national growth rates were obtained from two sources out of the Department of Labor [1], [2]. The initial growth rates are shown in Table 4. It must be emphasized that these are parameters to the system and not calculated values. The calculated values appear in future versions of the eleven tables and are calculated on the basis of these assumed parameter values. This is, after all, a simulation model, which means the calculated values are only as accurate as the assumed parameters and relationships imply.

TABLE 3 UNEMPLOYMENT AND EMPLOYMENT IN SPECIFIED INDUSTRIES, BY OCCUPATION
ARROWHEAD , 1977

| NO. | INDUSTRY TITLE | PROFESSIONAL | MANAGERIAL | SALES WORKER | CLERICAL | CRAFTS | OPERATIVES | NONFARM NONMINE SERVICE | FARM | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) |
| 1 | DAIRY & PO | 83. | 22. | 23. | 24. | 29. | 82. | 203. | 9. | 1659. | 2077. |
| 2 | MEAT AN. & | 38. | 10. | 11. | 11. | 13. | 38. | 94. | 4. | 769. | 963. |
| 3 | FOOD, FEED | 20. | 5. | 5. | 6. | 7. | 19. | 48. | 2. | 391. | 489. |
| 4 | OTHER CROP | 18. | 5. | 5. | 5. | 6. | 18. | 44. | 2. | 359. | 450. |
| 5 | FOREST., F | 1. | 0. | 0. | 0. | 0. | 1. | 2. | 0. | 20. | 24. |
| 6 | AGR.,FOR., | 6. | 2. | 2. | 2. | 2. | 7. | 16. | 1. | 135. | 170. |
| 7 | IRON & FER | 1271. | 628. | 13. | 650. | 4034. | 4612. | 0. | 226. | 0. | 11409. |
| 8 | NONFERROUS | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 9 | COAL & PEA | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 10 | STONE.CLAY | 17. | 9. | 1. | 21. | 12. | 24. | 4. | 3. | 0. | 90. |
| 11 | OTHER MINI | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 12 | NEW CONSTR | 320. | 443. | 67. | 422. | 3749. | 649. | 1583. | 5421. | 0. | 6059. |
| 13 | MAIN. & RE | 171. | 85. | 509. | 7. | 108. | 269. | 117. | 33. | 0. | 1598. |
| 14 | ORDNANCE | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 15 | MEAT PRODU | 151. | 223. | 59. | 239. | 188. | 571. | 84. | 146. | 0. | 1555. |
| 16 | DAIRY PROD | 64. | 92. | 26. | 88. | 93. | 212. | 33. | 56. | 0. | 659. |
| 17 | CANNED,FRO | 132. | 216. | 50. | 233. | 155. | 488. | 72. | 134. | 0. | 1362. |
| 18 | GRAIN MILL | 5. | 6. | 2. | 7. | 5. | 17. | 3. | 4. | 0. | 49. |
| 19 | BAKERY PRO | 43. | 56. | 15. | 63. | 49. | 164. | 25. | 39. | 0. | 446. |
| 20 | ALCH. BEV. | 35. | 55. | 14. | 48. | 42. | 131. | 20. | 25. | 0. | 359. |
| 21 | MISC. FOOD | 11. | 13. | 3. | 14. | 13. | 40. | 5. | 7. | 0. | 96. |
| 22 | TEXTILE GO | 27. | 17. | 3. | 24. | 31. | 62. | 3. | 7. | 0. | 152. |
| 23 | APPAREL, F | 304. | 157. | 31. | 213. | 306. | 776. | 40. | 68. | 0. | 1699. |
| 24 | LOGGING | 23. | 30. | 15. | 43. | 66. | 155. | 20. | 39. | 0. | 368. |
| 25 | SAWMILLS | 15. | 30. | 11. | 36. | 55. | 103. | 10. | 18. | 0. | 234. |
| 26 | PARTICLEBO | 1. | 2. | 1. | 3. | 4. | 7. | 1. | 1. | 0. | 17. |
| 27 | OTHER WOOD | 37. | 75. | 29. | 91. | 138. | 258. | 25. | 45. | 0. | 585. |
| 28 | FURNITURE | 3. | 5. | 3. | 7. | 12. | 19. | 2. | 4. | 0. | 55. |
| 29 | PULP & PAP | 647. | 293. | 53. | 592. | 313. | 438. | 279. | 91. | 0. | 2426. |
| 30 | PAPERBOARD | 42. | 20. | 3. | 28. | 20. | 28. | 19. | 7. | 0. | 157. |
| 31 | PRINTING & | 120. | 87. | 73. | 276. | 810. | 257. | 74. | 87. | 0. | 1748. |
| 32 | CHEM. & AL | 129. | 67. | 16. | 127. | 44. | 73. | 59. | 11. | 0. | 519. |
| 33 | PETR. REF. | 124. | 62. | 16. | 107. | 80. | 106. | 31. | 19. | 0. | 547. |
| 34 | RUBBER PRO | 28. | 3. | 2. | 10. | 22. | 53. | 7. | 5. | 0. | 156. |
| 35 | LEATHER PR | 1. | 1. | 0. | 1. | 1. | 3. | 0. | 0. | 0. | 7. |
| 36 | GLASS, STO | 124. | 63. | 18. | 112. | 118. | 233. | 32. | 41. | 0. | 694. |
| 37 | PRIMARY FE | 2. | 9. | 2. | 13. | 82. | 64. | 24. | 9. | 0. | 198. |
| 38 | IRON & STE | 1. | 7. | 1. | 8. | 55. | 45. | 16. | 5. | 0. | 133. |
| 39 | PRIMARY CO | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 1. |
| 40 | OTHER PRIM | 0. | 1. | 0. | 1. | 8. | 6. | 2. | 1. | 0. | 19. |
| 41 | FABRICATED | 30. | 20. | 10. | 36. | 107. | 191. | 16. | 15. | 0. | 428. |
| 42 | FARM MACHI | 69. | 16. | 2. | 22. | 37. | 50. | 2. | 7. | 0. | 207. |
| 43 | MACHINE SH | 15. | 4. | 1. | 5. | 8. | 10. | 0. | 1. | 0. | 45. |
| 44 | OTHER NON. | 215. | 58. | 7. | 66. | 111. | 145. | 5. | 21. | 0. | 642. |
| 45 | COMP., OFF | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 46 | SERV. IND. | 14. | 4. | 0. | 4. | 7. | 9. | 0. | 1. | 0. | 41. |
| 47 | ELECTRICAL | 16. | 7. | 1. | 7. | 10. | 18. | 1. | 2. | 0. | 61. |
| 48 | MOTOR VEHI | 7. | 3. | 1. | 3. | 5. | 15. | 1. | 2. | 0. | 40. |
| 49 | OTHER TRAN | 1. | 0. | 0. | 0. | 1. | 2. | 0. | 0. | 0. | 4. |
| 50 | PROF., SCI | 1. | 0. | 0. | 0. | 1. | 2. | 0. | 0. | 0. | 5. |
| 51 | OPTICAL, O | 5. | 2. | 0. | 3. | 5. | 11. | 1. | 1. | 0. | 30. |
| 52 | MISC. MFG. | 51. | 23. | 5. | 34. | 51. | 119. | 6. | 14. | 0. | 285. |
| 53 | RAILROAD T | 318. | 421. | 11. | 1651. | 822. | 517. | 146. | 94. | 0. | 3561. |
| 54 | LOCAL TRAN | 10. | 38. | 2. | 20. | 32. | 40. | 2. | 23. | 0. | 161. |
| 55 | TRUCK TRAN | 26. | 71. | 10. | 155. | 95. | 475. | 70. | 14. | 0. | 846. |
| 56 | AIR TRANS. | 8. | 23. | 2. | 10. | 28. | 35. | 2. | 15. | 0. | 132. |
| 57 | OTHER TRAN | 25. | 101. | 6. | 54. | 108. | 106. | 4. | 48. | 0. | 400. |
| 58 | COMMUNICAT | 233. | 134. | 32. | 828. | 361. | 21. | 3. | 10. | 0. | 1521. |
| 59 | ELECTRIC U | 136. | 109. | 12. | 180. | 473. | 137. | 51. | 29. | 0. | 1130. |
| 60 | GAS UTILIT | 36. | 27. | 7. | 57. | 110. | 38. | 29. | 3. | 0. | 307. |
| 61 | WATER & SA | 4. | 8. | 0. | 6. | 27. | 32. | 70. | 1. | 0. | 139. |
| 62 | WHOLESALE | 580. | 1183. | 802. | 1315. | 589. | 1009. | 250. | 155. | 0. | 5397. |
| 63 | RETAIL TRA | 757. | 2221. | 3025. | 3226. | 1791. | 2030. | 833. | 4456. | 0. | 17894. |
| 64 | FINANCE, I | 260. | 552. | 429. | 1195. | 35. | 10. | 12. | 95. | 0. | 2298. |
| 65 | REAL ESTAT | 134. | 296. | 238. | 579. | 22. | 6. | 6. | 65. | 0. | 1190. |
| 66 | HOTELS, PE | 373. | 364. | 81. | 823. | 338. | 878. | 29. | 2335. | 0. | 5489. |
| 67 | BUSINESS S | 1361. | 204. | 76. | 873. | 179. | 317. | 29. | 269. | 0. | 3169. |
| 68 | EAT.&DRINK | 309. | 999. | 1376. | 1578. | 757. | 931. | 416. | 1735. | 0. | 7295. |
| 69 | AUTOMOBILE | 537. | 75. | 8. | 250. | 113. | 53. | 33. | 281. | 0. | 1270. |
| 70 | MOTION PIC | 277. | 34. | 4. | 130. | 44. | 31. | 13. | 132. | 0. | 656. |
| 71 | HEALTH SER | 5683. | 511. | 37. | 413. | 148. | 172. | 26. | 1419. | 0. | 12064. |
| 72 | EDUC., NON | 2188. | 182. | 17. | 702. | 83. | 79. | 14. | 1224. | 0. | 4645. |
| 73 | FED. GOV'T | 160. | 97. | 1. | 362. | 80. | 29. | 47. | 19. | 0. | 799. |
| 74 | STATE & LO | 147. | 155. | 2. | 166. | 54. | 24. | 43. | 190. | 0. | 853. |
| 75 | SCRAP, USE | 11665. | 2000. | 26. | 6807. | 727. | 390. | 364. | 4001. | 0. | 25980. |
| | TOTAL | 29667. | 12744. | 7312. | 25094. | 18030. | 17961. | 5516. | 23253. | 3333. | 142909. |
| | UNEMPLOYMENT | 6533. | 2806. | 1610. | 5526. | 3970. | 3955. | 1215. | 5121. | 734. | 31471. |

Table 5 and 6 present the format of the two tables discussed earlier for the year 2000. The user has the ability to obtain these values for that specific year, or for any individual year in between. This is shown most clearly by referring to Table 7, which summarizes the industrial totals over several years in terms of U.S. gross output, regional gross output and regional total employment.

Looking at these series of tables once again, and emphasizing the twenty-sixth sector, "Particleboard," it can be seen that the growth rates summarized in Table 4 are reflected in an increase of a little over $79 million in increased regional output for the industry in constant 1977 prices.

Over the past year, a great deal has been accomplished in the process of making SIMLAB a highly qualified tool for research in the Wood Products industries, among these is the individual Particleboard industry. The relevant market for this product has been defined and consistent data of very comparable quality has been incorporated into SIMLAB.

The data collection problems which were caused primarily by improper market delineation have largely been overcome with the addition of the Particleboard sector. With these developments in place, the model is capable of recognizing and identifying the rather significant economic and demographic impacts which this fast-growing industry will have on the region and the state.

## RUN MODIFICATIONS

The baseline run is made with the parameters currently in the system unchanged. However, the SIMLAB model allows the user to change any or all of the parameters in the system. Of the 125 parameters and variables in the system, 72 are changeable by the user. These can be changed to more closely reflect what the user sees to be reality, or simply for the purpose of seeing

Table 4: National Growth Rate
Current Parameters

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | DAIRY & PO | -.00567 | .05732 | .02375 | .02375 | .02375 |
| 2 | MEAT AN. & | .01988 | .02765 | .01803 | .01803 | .01803 |
| 3 | FOOD, FEED | .03739 | .02882 | .02351 | .02351 | .02351 |
| 4 | OTHER CROP | -.00175 | .06248 | .02531 | .02531 | .02531 |
| 5 | FOREST., F | -.03796 | .10608 | .02039 | .02039 | .02039 |
| 6 | AGR.,FOR.. | .00242 | .05431 | .02680 | .02680 | .02680 |
| 7 | IRON & FER | .06904 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 8 | NONFERROUS | -.04941 | .04425 | .01531 | .01531 | .01531 |
| 9 | COAL & PEA | .07051 | .07658 | .03557 | .03557 | .03557 |
| 10 | STONE,CLAY | .01805 | -.03410 | .01767 | .01767 | .01767 |
| 11 | OTHER MINI | .03320 | .00191 | -.00079 | -.00079 | -.00079 |
| 12 | NEW CONSTR | -.02589 | .05196 | .01097 | .01097 | .01097 |
| 13 | MAIN. & RE | .03568 | .00160 | .02588 | .02588 | .02588 |
| 14 | ORDNANCE | .05325 | .04651 | .01602 | .01602 | .01602 |
| 15 | MEAT PRODU | .01491 | .02203 | .02081 | .02081 | .02081 |
| 16 | DAIRY PROD | -.00137 | .04539 | .01601 | .01601 | .01601 |
| 17 | CANNED,FRO | -.00766 | .02874 | .01877 | .01877 | .01877 |
| 18 | GRAIN MILL | -.00618 | .04249 | .02366 | .02366 | .02366 |
| 19 | BAKERY PRO | .00309 | .01528 | .00717 | .00717 | .00717 |
| 20 | ALCH. BEV. | .03101 | .04277 | .03288 | .03288 | .03288 |
| 21 | MISC. FOOD | .02983 | .00214 | .01499 | .01499 | .01499 |
| 22 | TEXTILE GO | -.01664 | .05696 | .02619 | .02619 | .02619 |
| 23 | APPAREL, F | -.00498 | .03524 | .02722 | .02722 | .02722 |
| 24 | LOGGING | -.06114 | .06577 | .02477 | .02477 | .02477 |
| 25 | SAWMILLS | -.05197 | .05621 | .01677 | .01677 | .01677 |
| 26 | PARTICLEBO | -.04848 | .05494 | .01432 | .01432 | .01432 |
| 27 | OTHER WOOD | -.04848 | .05494 | .01432 | .01432 | .01432 |
| 28 | FURNITURE | -.00488 | .04550 | .02290 | .02290 | .02290 |
| 29 | PULP & PAP | .02509 | .01499 | .02773 | .02773 | .02773 |
| 30 | PAPERBOARD | -.00978 | .04304 | .02701 | .02701 | .02701 |
| 31 | PRINTING & | .03424 | .02614 | .02866 | .02866 | .02866 |
| 32 | CHEM. & AL | .02136 | .04032 | .03129 | .03129 | .03129 |
| 33 | PETR. REF. | .00580 | -.01330 | -.00787 | -.00787 | -.00787 |
| 34 | RUBBER PRO | -.02597 | .06263 | .03813 | .03813 | .03813 |
| 35 | LEATHER PR | -.04557 | .04077 | .01615 | .01615 | .01615 |
| 36 | GLASS, STO | -.01113 | .03808 | .02193 | .02193 | .02193 |
| 37 | PRIMARY FE | -.03307 | .05559 | .00847 | .00847 | .00847 |
| 38 | IRON & STE | -.05872 | .06356 | .01805 | .01805 | .01805 |
| 39 | PRIMARY CO | -.06479 | .09772 | .02531 | .02531 | .02531 |
| 40 | OTHER PRIM | -.00424 | .04956 | .02994 | .02994 | .02994 |
| 41 | FABRICATED | -.01413 | .04300 | .02328 | .02328 | .02328 |
| 42 | FARM MACHI | -.00036 | .05132 | .03812 | .03812 | .03812 |
| 43 | MACHINE SH | .04283 | .01634 | .03127 | .03127 | .03127 |
| 44 | OTHER NON. | .02552 | .03504 | .03440 | .03440 | .03440 |
| 45 | COMP., OFF | .19659 | -.00532 | .08102 | .08102 | .08102 |
| 46 | SERV. IND. | .06040 | .01589 | .02743 | .02743 | .02743 |
| 47 | ELECTRICAL | .06851 | .01813 | .03886 | .03886 | .03886 |
| 48 | MOTOR VEHI | -.10900 | .07504 | .03264 | .03264 | .03264 |
| 49 | OTHER TRAN | .08091 | .05402 | .03237 | .03237 | .03237 |
| 50 | PROF., SCI | .02306 | .04804 | .03189 | .03189 | .03189 |
| 51 | OPTICAL, O | .06376 | .02434 | .03829 | .03829 | .03829 |
| 52 | MISC. MFG. | -.01487 | .04349 | .02133 | .02133 | .02133 |
| 53 | RAILROAD T | .02219 | .02138 | .02366 | .02366 | .02366 |
| 54 | LOCAL TRAN | .01622 | .00327 | .02103 | .02103 | .02103 |
| 55 | TRUCK TRAN | .01146 | .00834 | .02875 | .02875 | .02875 |
| 56 | AIR TRANS. | .06171 | .02027 | .04593 | .04593 | .04593 |
| 57 | OTHER TRAN | .02887 | .02562 | .02790 | .02790 | .02790 |
| 58 | COMMUNICAT | .09163 | .04381 | .06371 | .06371 | .06371 |
| 59 | ELECTRIC U | .02556 | .03034 | .03680 | .03680 | .03680 |
| 60 | GAS UTILIT | .02088 | -.00201 | .00788 | .00788 | .00788 |
| 61 | WATER & SA | .03233 | .01077 | .02953 | .02953 | .02953 |
| 62 | WHOLESALE | .01858 | .02670 | .03031 | .03031 | .03031 |
| 63 | RETAIL TRA | .01905 | -.00091 | .03332 | .03332 | .03332 |
| 64 | FINANCE, I | .06835 | -.01188 | .03118 | .03118 | .03118 |
| 65 | REAL ESTAT | .04437 | -.00286 | .02890 | .02890 | .02890 |
| 66 | HOTELS, PE | -.00928 | .01466 | .01828 | .01828 | .01828 |
| 67 | BUSINESS S | .06220 | .00684 | .03299 | .03299 | .03299 |
| 68 | EAT.&DRINK | .00107 | .02828 | .02742 | .02742 | .02742 |
| 69 | AUTOMOBILE | .02749 | .02042 | .03440 | .03440 | .03440 |
| 70 | MOTION PIC | .03658 | .01984 | .03763 | .03763 | .03763 |
| 71 | HEALTH SER | .03448 | .02258 | .03560 | .03560 | .03560 |
| 72 | EDUC., NON | .05956 | -.00577 | .02609 | .02609 | .02609 |
| 73 | FED. GOV'T | .02497 | -.00140 | .02493 | .02493 | .02493 |
| 74 | STATE & LO | .03487 | .02153 | .02681 | .02681 | .02681 |
| 75 | SCRAP, USE | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

TABLE 5 EXPORT MARKET INDICATORS OF SPECIFIED INDUSTRIES
ARROWHEAD , 2000

| NO. | INDUSTRY TITLE | GROSS OUTPUT | | ACTUAL MARKET SHARE | | | POTENTIAL MARKET SHARE | |
|---|---|---|---|---|---|---|---|---|
| | | UNITED STATES | TOTAL REGION | REGIONAL EXPORT | PERCENT OF U.S. GROSS OUTPUT | ANNUAL CHANGE | EXPORTS | PERCENT OF OF U.S. GROSS OUTPUT |
| | | (10'S OF THOU) | (HUND) | (HUND) | (PERCENT) | (PERCENT) | (HUND) | (PERCENT) |
| 1 | DAIRY & PO | 374994. | 247422. | -519. | -.0001 | -.1175 | 0. | 0.0000 |
| 2 | MEAT AN. & | 603871. | 34101. | -580. | -.0001 | -.0924 | 0. | 0.0000 |
| 3 | FOOD, FEED | 515206. | 27664. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 4 | OTHER CROP | 641655. | 23372. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 5 | FOREST., F | 80575. | 35580. | -229. | -.0003 | -.0240 | 0. | 0.0000 |
| 6 | AGR.,FOR., | 120184. | 45018. | -39. | -.0000 | -.2387 | 0. | 0.0000 |
| 7 | IRON & FER | 24445. | 10352044. | 10211385. | 41.7724 | 0.0000 | 10211385. | 41.7724 |
| 8 | NONFERROUS | 48817. | -0. | -11. | -.0000 | -.0027 | 0. | 0.0000 |
| 9 | COAL & PEA | 472307. | -0. | -13. | -.0000 | -.0045 | 0. | 0.0000 |
| 10 | STONE,CLAY | 42414. | 36377. | -12959. | -.0306 | .0283 | 0. | 0.0000 |
| 11 | OTHER MINI | 524514. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 12 | NEW CONSTR | 2593824. | 4188920. | 2523895. | .0973 | 0.0000 | 2523895. | .0973 |
| 13 | MAIN. & RE | 1015986. | 1384133. | -1289. | -.0001 | -.1742 | 0. | 0.0000 |
| 14 | ORDNANCE | 153919. | 0. | -746. | -.0005 | -.0026 | 0. | 0.0000 |
| 15 | MEAT PRODU | 756901. | 338177. | -447734. | -.0592 | .0043 | 1599249. | .2113 |
| 16 | DAIRY PROD | 390474. | 1459635. | 1066542. | .2731 | .0011 | 1077510. | .2759 |
| 17 | CANNED,FRO | 341295. | 52827. | -213310. | -.0625 | 0.0000 | -213310. | -.0625 |
| 18 | GRAIN MILL | 418738. | 65355. | 3038. | .0007 | .0104 | 3145. | .0008 |
| 19 | BAKERY PRO | 157721. | 276849. | 21302. | .0135 | .0166 | 21302. | .0135 |
| 20 | ALCH. BEV. | 643635. | 852412. | 662560. | .1029 | .0015 | 681674. | .1059 |
| 21 | MISC. FOOD | 684210. | 169852. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 22 | TEXTILE GO | 704021. | 114489. | 72921. | .0104 | .0004 | 73838. | .0105 |
| 23 | APPAREL, F | 878368. | 657703. | 283829. | .0323 | .0021 | 286234. | .0326 |
| 24 | LOGGING | 199780. | 1096169. | 123855. | .0620 | -.0000 | 134578. | .0674 |
| 25 | SAWMILLS | 177610. | 330189. | 23295. | .0131 | -.0011 | 25967. | .0146 |
| 26 | PARTICLEBO | 29460. | 819186. | 804791. | 2.7318 | -.0007 | 834770. | 2.8335 |
| 27 | OTHER WOOD | 261728. | 768005. | 543791. | .2078 | .0001 | 550746. | .2104 |
| 28 | FURNITURE | 299509. | 57388. | 174. | .0001 | -.1394 | 368. | .0001 |
| 29 | PULP & PAP | 660860. | 7498570. | 7180482. | 1.0865 | .0000 | 7319432. | 1.1076 |
| 30 | PAPERBOARD | 243558. | 83086. | -108. | -.0000 | 0.0000 | 0. | 0.0000 |
| 31 | PRINTING & | 932992. | 144906. | -401631. | -.0430 | -.0019 | 103571. | .0111 |
| 32 | CHEM. & AL | 2296198. | 870296. | 417957. | .0182 | .0004 | 424521. | .0185 |
| 33 | PETR. REF. | 896511. | 682544. | -1533685. | -.1711 | .0213 | -348528. | -.0389 |
| 34 | RUBBER PRO | 822383. | 86353. | -123. | -.0000 | -.1223 | 0. | 0.0000 |
| 35 | LEATHER PR | 108869. | 2135. | -16. | -.0000 | -.5539 | 0. | 0.0000 |
| 36 | GLASS, STO | 561880. | 847445. | 513577. | .0914 | .0000 | 521605. | .0928 |
| 37 | PRIMARY FE | 704082. | 411400. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 38 | IRON & STE | 239431. | 204962. | 58068. | .0243 | -.0003 | 59180. | .0247 |
| 39 | PRIMARY CO | 322321. | 3914. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 40 | OTHER PRIM | 524684. | 51640. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 41 | FABRICATED | 1383053. | 716047. | 331505. | .0240 | .0001 | 338032. | .0244 |
| 42 | FARM MACHI | 270377. | 313775. | 169973. | .0629 | -.0027 | 172271. | .0637 |
| 43 | MACHINE SH | 152593. | 36324. | -135. | -.0001 | -.0198 | 0. | 0.0000 |
| 44 | OTHER NON. | 1490805. | 933198. | 185422. | .0124 | -.0042 | 199306. | .0134 |
| 45 | COMP., OFF | 803393. | 0. | -101622. | -.0126 | -.0113 | 0. | 0.0000 |
| 46 | SERV. IND. | 225273. | 63851. | -415. | -.0002 | .0870 | 0. | 0.0000 |
| 47 | ELECTRICAL | 2022268. | 295155. | -1457. | -.0001 | -.1405 | 0. | 0.0000 |
| 48 | MOTOR VEHI | 2275945. | 184546. | -4036. | -.0002 | 1.1896 | 0. | 0.0000 |
| 49 | OTHER TRAN | 1240388. | 85975. | -706. | -.0001 | -.2469 | 0. | 0.0000 |
| 50 | PROF., SCI | 287498. | 27614. | -76. | -.0000 | -.0221 | 0. | 0.0000 |
| 51 | OPTICAL, O | 277212. | 51400. | 5751. | .0021 | .0040 | 5808. | .0021 |
| 52 | MISC. MFG. | 312881. | 275955. | 94007. | .0300 | .0012 | 94500. | .0302 |
| 53 | RAILROAD T | 365963. | 1975734. | 1432780. | .3915 | .0002 | 1455294. | .3977 |
| 54 | LOCAL TRAN | 127184. | 77628. | -99. | -.0001 | -.1044 | 0. | 0.0000 |
| 55 | TRUCK TRAN | 723507. | 285112. | -311. | -.0000 | -.0460 | 0. | 0.0000 |
| 56 | AIR TRANS. | 604889. | 108983. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 57 | OTHER TRAN | 361358. | 143999. | -192. | -.0001 | -.1479 | 0. | 0.0000 |
| 58 | COMMUNICAT | 2283905. | 954202. | 229801. | .0101 | .0050 | 232958. | .0102 |
| 59 | ELECTRIC U | 1223832. | 2161851. | 528923. | .0432 | .0025 | 534533. | .0437 |
| 60 | GAS UTILIT | 425460. | 847265. | -500. | -.0001 | -.2039 | 0. | 0.0000 |
| 61 | WATER & SA | 81372. | 211377. | 85482. | .1051 | .0016 | 86237. | .1060 |
| 62 | WHOLESALE | 3217483. | 2116111. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 63 | RETAIL TRA | 3134743. | 4768814. | 948887. | .0303 | .0225 | 948887. | .0303 |
| 64 | FINANCE, I | 2237051. | 1427987. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 65 | REAL ESTAT | 4744410. | 4948021. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 66 | HOTELS, PE | 600332. | 373601. | -322132. | -.0537 | .0317 | 201405. | .0335 |
| 67 | BUSINESS S | 2461456. | 1054172. | -784. | -.0000 | -.2327 | 0. | 0.0000 |
| 68 | EAT.&DRINK | 1437406. | 2075599. | 483989. | .0337 | .0091 | 483989. | .0337 |
| 69 | AUTOMOBILE | 877636. | 633130. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 70 | MOTION PIC | 492377. | 176976. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 71 | HEALTH SER | 2352176. | 1885386. | -482415. | -.0205 | -11.8440 | 950608. | .0404 |
| 72 | EDUC., NON | 758840. | 764640. | 85605. | .0113 | .0188 | 85605. | .0113 |
| 73 | FED. GOV'T | 301678. | 266024. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 74 | STATE & LO | 364086. | 463837. | -66. | -.0000 | -.4753 | 0. | 0.0000 |
| 75 | SCRAP, USE | 29604. | 3655853. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| | TOTAL | 61418367. | 68680262. | 25565648. | .0042 | 0.0000 | 31680563. | .0052 |

TABLE 6 UNEMPLOYMENT AND EMPLOYMENT IN SPECIFIED INDUSTRIES, BY OCCUPATION
ARROWHEAD , 2000

| NO. | INDUSTRY TITLE | PROFESSIONAL | MANAGERIAL | SALES WORKER | CLERICAL | CRAFTS | OPERATIVES | NONFARM NONMINE SERVICE | | FARM | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) |
| 1 | DAIRY & PO | 73. | 19. | 20. | 21. | 26. | 73. | 179. | 8. | 1463. | 1882. |
| 2 | MEAT AN. & | 5. | 1. | 1. | 1. | 2. | 5. | 11. | 1. | 93. | 120. |
| 3 | FOOD, FEED | 7. | 2. | 2. | 2. | 3. | 7. | 18. | 1. | 145. | 187. |
| 4 | OTHER CROP | 11. | 3. | 3. | 3. | 4. | 11. | 26. | 1. | 212. | 273. |
| 5 | FOREST., F | 0. | 0. | 0. | 0. | 0. | 1. | 1. | 0. | 14. | 17. |
| 6 | AGR.,FOR., | 6. | 2. | 2. | 2. | 2. | 6. | 14. | 1. | 120. | 154. |
| 7 | IRON & FER | 1018. | 503. | 11. | 521. | 3233. | 3696. | 0. | 181. | 0. | 9164. |
| 8 | NONFERROUS | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 9 | COAL & PEA | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 10 | STONE,CLAY | 13. | 7. | 1. | 16. | 9. | 19. | 3. | 2. | 0. | 71. |
| 11 | OTHER MINI | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 12 | NEW CONSTR | 120. | 166. | 25. | 158. | 1401. | 242. | 591. | 2025. | 0. | 4728. |
| 13 | MAIN. & RE | 282. | 140. | 841. | 11. | 179. | 445. | 193. | 54. | 0. | 2145. |
| 14 | ORDNANCE | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 15 | MEAT PRODU | 19. | 28. | 7. | 30. | 23. | 71. | 10. | 18. | 0. | 205. |
| 16 | DAIRY PROD | 42. | 60. | 17. | 57. | 61. | 139. | 21. | 36. | 0. | 434. |
| 17 | CANNED,FRO | 5. | 7. | 2. | 8. | 5. | 17. | 2. | 5. | 0. | 51. |
| 18 | GRAIN MILL | 3. | 4. | 1. | 4. | 3. | 10. | 2. | 2. | 0. | 27. |
| 19 | BAKERY PRO | 38. | 49. | 13. | 56. | 44. | 145. | 22. | 35. | 0. | 402. |
| 20 | ALCH. BEV. | 30. | 47. | 12. | 41. | 36. | 112. | 17. | 22. | 0. | 316. |
| 21 | MISC. FOOD | 7. | 9. | 2. | 10. | 9. | 28. | 3. | 5. | 0. | 74. |
| 22 | TEXTILE GO | 19. | 12. | 2. | 16. | 21. | 42. | 2. | 5. | 0. | 118. |
| 23 | APPAREL, F | 218. | 113. | 22. | 153. | 220. | 557. | 29. | 49. | 0. | 1361. |
| 24 | LOGGING | 15. | 19. | 10. | 27. | 42. | 99. | 13. | 25. | 0. | 250. |
| 25 | SAWMILLS | 9. | 19. | 7. | 23. | 35. | 66. | 7. | 12. | 0. | 179. |
| 26 | PARTICLEBO | 17. | 35. | 13. | 42. | 64. | 119. | 12. | 21. | 0. | 323. |
| 27 | OTHER WOOD | 25. | 50. | 19. | 61. | 92. | 172. | 17. | 30. | 0. | 465. |
| 28 | FURNITURE | 4. | 5. | 3. | 8. | 14. | 22. | 3. | 4. | 0. | 64. |
| 29 | PULP & PAP | 690. | 313. | 57. | 632. | 334. | 467. | 297. | 97. | 0. | 2887. |
| 30 | PAPERBOARD | 25. | 12. | 2. | 17. | 12. | 17. | 12. | 4. | 0. | 101. |
| 31 | PRINTING & | 23. | 16. | 14. | 52. | 153. | 48. | 14. | 16. | 0. | 336. |
| 32 | CHEM. & AL | 119. | 62. | 15. | 117. | 40. | 67. | 54. | 10. | 0. | 485. |
| 33 | PETR. REF. | 41. | 21. | 5. | 36. | 27. | 35. | 10. | 6. | 0. | 182. |
| 34 | RUBBER PRO | 27. | 3. | 2. | 9. | 21. | 51. | 6. | 5. | 0. | 125. |
| 35 | LEATHER PR | 1. | 0. | 0. | 1. | 1. | 2. | 0. | 0. | 0. | 6. |
| 36 | GLASS, STO | 111. | 57. | 16. | 101. | 106. | 209. | 29. | 37. | 0. | 666. |
| 37 | PRIMARY FE | 1. | 8. | 1. | 10. | 66. | 51. | 19. | 7. | 0. | 163. |
| 38 | IRON & STE | 1. | 7. | 1. | 9. | 58. | 47. | 17. | 5. | 0. | 144. |
| 39 | PRIMARY CO | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 1. |
| 40 | OTHER PRIM | 0. | 1. | 0. | 1. | 6. | 4. | 2. | 0. | 0. | 13. |
| 41 | FABRICATED | 34. | 22. | 12. | 41. | 123. | 219. | 19. | 17. | 0. | 487. |
| 42 | FARM MACHI | 59. | 14. | 2. | 18. | 31. | 42. | 2. | 6. | 0. | 174. |
| 43 | MACHINE SH | 14. | 4. | 0. | 4. | 7. | 10. | 0. | 1. | 0. | 41. |
| 44 | OTHER NON. | 194. | 52. | 7. | 60. | 101. | 131. | 5. | 19. | 0. | 569. |
| 45 | COMP., OFF | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 46 | SERV. IND. | 14. | 4. | 0. | 4. | 7. | 9. | 0. | 1. | 0. | 40. |
| 47 | ELECTRICAL | 57. | 24. | 3. | 26. | 35. | 64. | 2. | 7. | 0. | 219. |
| 48 | MOTOR VEHI | 9. | 3. | 1. | 4. | 6. | 19. | 1. | 3. | 0. | 47. |
| 49 | OTHER TRAN | 9. | 3. | 1. | 5. | 7. | 22. | 1. | 2. | 0. | 51. |
| 50 | PROF., SCI | 5. | 2. | 0. | 2. | 4. | 11. | 1. | 1. | 0. | 27. |
| 51 | OPTICAL, 0 | 4. | 2. | 0. | 2. | 4. | 9. | 1. | 1. | 0. | 23. |
| 52 | MISC. MFG. | 41. | 18. | 4. | 27. | 41. | 96. | 5. | 12. | 0. | 245. |
| 53 | RAILROAD T | 173. | 229. | 6. | 899. | 448. | 282. | 80. | 51. | 0. | 2168. |
| 54 | LOCAL TRAN | 12. | 46. | 3. | 24. | 39. | 49. | 2. | 27. | 0. | 202. |
| 55 | TRUCK TRAN | 27. | 73. | 10. | 159. | 97. | 487. | 72. | 14. | 0. | 940. |
| 56 | AIR TRANS. | 7. | 18. | 1. | 8. | 22. | 28. | 1. | 12. | 0. | 98. |
| 57 | OTHER TRAN | 12. | 48. | 3. | 25. | 51. | 50. | 2. | 23. | 0. | 213. |
| 58 | COMMUNICAT | 130. | 75. | 18. | 462. | 202. | 12. | 2. | 6. | 0. | 905. |
| 59 | ELECTRIC U | 112. | 89. | 10. | 148. | 388. | 113. | 42. | 24. | 0. | 925. |
| 60 | GAS UTILIT | 55. | 42. | 10. | 88. | 168. | 58. | 44. | 5. | 0. | 469. |
| 61 | WATER & SA | 5. | 10. | 0. | 7. | 31. | 36. | 79. | 1. | 0. | 169. |
| 62 | WHOLESALE | 416. | 849. | 575. | 944. | 422. | 725. | 179. | 112. | 0. | 4223. |
| 63 | RETAIL TRA | 842. | 2470. | 3365. | 3588. | 1992. | 2258. | 926. | 4956. | 0. | 20398. |
| 64 | FINANCE, I | 351. | 747. | 581. | 1618. | 48. | 13. | 16. | 128. | 0. | 3502. |
| 65 | REAL ESTAT | 168. | 370. | 297. | 724. | 27. | 7. | 8. | 82. | 0. | 1684. |
| 66 | HOTELS, PE | 168. | 164. | 36. | 370. | 152. | 394. | 13. | 1049. | 0. | 2346. |
| 67 | BUSINESS S | 1442. | 216. | 81. | 925. | 189. | 336. | 30. | 285. | 0. | 3505. |
| 68 | EAT.&DRINK | 459. | 1486. | 2046. | 2347. | 1126. | 1384. | 619. | 2581. | 0. | 12047. |
| 69 | AUTOMOBILE | 772. | 108. | 11. | 359. | 163. | 76. | 47. | 404. | 0. | 1940. |
| 70 | MOTION PIC | 313. | 39. | 4. | 146. | 50. | 35. | 14. | 148. | 0. | 750. |
| 71 | HEALTH SER | 6870. | 618. | 45. | 500. | 179. | 209. | 31. | 1716. | 0. | 10166. |
| 72 | EDUC., NON | 2525. | 210. | 20. | 811. | 95. | 91. | 16. | 1413. | 0. | 5182. |
| 73 | FED. GOV'T | 169. | 103. | 1. | 382. | 84. | 31. | 50. | 20. | 0. | 840. |
| 74 | STATE & LO | 241. | 254. | 4. | 273. | 89. | 39. | 70. | 312. | 0. | 1281. |
| 75 | SCRAP, USE | 15634. | 2681. | 35. | 9122. | 975. | 522. | 487. | 5362. | 0. | 34819. |
| | TOTAL | 34370. | 12894. | 8342. | 26381. | 13754. | 14968. | 4523. | 21534. | 2049. | 138817. |
| | UNEMPLOYMENT | 4470. | 978. | 240. | 1283. | 1708. | 2014. | 250. | 2513. | 249. | 13706. |

Table 7: Selected Gross Output and Employment - Intermediate Year Totals, Baseline 1977-2000

| Year | U.S. Gross Output (100,000) | Regional Output (100) | Regional Employment (No) |
|---|---|---|---|
| 1977 | $33,457,093 | $57,860,550 | 142,906 |
| 1980 | 35,556,739 | 56,915,284 | 133,722 |
| 1985 | 40,297,640 | 57,522,939 | 137,175 |
| 1990 | 46,214,048 | 61,545,370 | 139,752 |
| 2000 | 61,418,367 | 68,680,262 | 138,817 |

what happens to the calculated values for the variables when such changes are made.

For example, the internal values for the parameters of the Particleboard industry are seen to be too low from actual experience for the years 1980 through 1985. The industry is currently displaying exceptional growth characteristics nationally with strong realized and potential growth for the region as well. Several values in particular are seen to be out of line on the low side: (1) the U.S. national growth rate for 1980-1985, regional earnings, regional employment in the particleboard industry, gross regional output, regional exports and regional market share (the items that follow the U.S. Growth Rate presume the addition of a plant or plants producing waferboard in the region).

The basic assumption for the region is that a new waferboard plant will be operational in the year 1985. This plant, along with the two existing plants in the region, will fully participate in the national growth for these industries.

It should be noted that the modified runs do not reflect the construction phase for the new plant. While construction figures can be inserted into the SIMLAB program, the lack of information at the time of the writing of this report requires that such modifications be reserved for a future simulation.

The national growth rate for this industry for the years 1980-1985 was listed as being roughly 2 percent per year. The actual performance in this industry plus near term projected growth to the year 1985 is closer to 8%. This new figure was substituted for the 2 percent BLS projection.

Regional earnings were assumed to increase by $1,325 due to the presence of a new plant. Direct regional employment in the particleboard industry is assumed to increase by 130 due to the new plant. Gross regional product is seen to increase by $16,320 due to the new plant. Regional exports are seen to

increase by $16,320 with the new plant. The regional market share is assumed to increase to 3 percent due to the new plant in the region.

Tables 8, 9 and 10 reflect the results of changes in parameters. These tables are similar to the ones discussed in the baseline presentation and such discussion need not be repeated in detail here. It might just be noted that sector 26 shows an increase in every case over the baseline results, as would be expected with the higher new set of values for the parameters.

IMPACT ANALYSIS

Estimating the impacts of an expanded/ing waferboard industry in northeast Minnesota is possible when one compares the baseline run to the run made with modifications. Each of the parameters discussed earlier were changed in the modified run to approximate, as closely as possible, the addition of another waferboard plant in the region. The plant would have similar output, consumption, employment, and wage and salary characteristics as the two which already exist. When the baseline run is modified to include this plant, the process of estimating its regional impact becomes one of simply identifying and subsequently tracing out the changes which result from it. Now, let us turn our attention to the modified run tables. (5-6)

The effects of adding another waferboard plant in northeastern Minnesota can be examined both individually on an industry by industry basis, as well as on an aggregated level. Tables 8 and 9 are the modified 75-sector results while tables 10 and 11 combine the sectors to show the changes over time and comparisons of the two runs on a basis of regional totals. Figures 1 and 2 give a graphical comparison of the information contained in Table 11.

Upon examination, one will notice that Sector 26 shows an increase in every case over the baseline results, which is to be expected given the plant addition and generally positive new set of parameters for this industry. A

TABLE 8 EXPORT MARKET INDICATORS OF SPECIFIED INDUSTRIES
ARROWHEAD , 2000

| INDUSTRY NO. | TITLE | GROSS OUTPUT UNITED STATES | GROSS OUTPUT TOTAL REGION | ACTUAL MARKET SHARE REGIONAL EXPORT | ACTUAL MARKET SHARE PERCENT OF U.S. GROSS OUTPUT | ACTUAL MARKET SHARE ANNUAL CHANGE | POTENTIAL MARKET SHARE EXPORTS | POTENTIAL MARKET SHARE PERCENT OF U.S. GROSS OUTPUT |
|---|---|---|---|---|---|---|---|---|
| | | (10'S OF THOU) | (HUND) | (HUND) | (PERCENT) | (PERCENT) | (HUND) | (PERCENT) |
| 1 | DAIRY & PO | $ 374994. | 247922. | -542. | -.0001 | -.1133 | 0. | 0.0000 |
| 2 | MEAT AN. & | 603871. | 34113. | -599. | -.0001 | -.0895 | 0. | 0.0000 |
| 3 | FOOD, FEED | 515206. | 27734. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 4 | OTHER CROP | 641655. | 23529. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 5 | FOREST., F | 80575. | 35797. | -235. | -.0003 | -.0236 | 0. | 0.0000 |
| 6 | AGR.,FOR., | 120184. | 45250. | -47. | -.0000 | -.2176 | 0. | 0.0000 |
| 7 | IRON & FER | 24445. | 10352136. | 10211385. | 41.7724 | 0.0000 | 10211385. | 41.7724 |
| 8 | NONFERROUS | 48817. | -0. | -11. | -.0000 | -.0027 | 0. | 0.0000 |
| 9 | COAL & PEA | 472307. | -0. | -13. | -.0000 | -.0043 | 0. | 0.0000 |
| 10 | STONE,CLAY | 42414. | 36366. | -13089. | -.0309 | .0281 | 0. | 0.0000 |
| 11 | OTHER MINI | 524514. | 0. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 12 | NEW CONSTR | 2593824. | 4202293. | 2523895. | .0973 | 0.0000 | 2523895. | .0973 |
| 13 | MAIN. & RE | 1015986. | 1389696. | -1465. | -.0001 | -.1608 | 0. | 0.0000 |
| 14 | ORDNANCE | 153919. | 0. | -757. | -.0005 | -.0021 | 0. | 0.0000 |
| 15 | MEAT PRODU | 756901. | 338169. | -453389. | -.0599 | .0046 | 1599249. | .2113 |
| 16 | DAIRY PROD | 390474. | 1461337. | 1066261. | .2731 | .0011 | 1077510. | .2759 |
| 17 | CANNED,FRO | 341295. | 53239. | -213310. | -.0625 | 0.0000 | -213310. | -.0625 |
| 18 | GRAIN MILL | 418738. | 65555. | 3028. | .0007 | .0102 | 3145. | .0008 |
| 19 | BAKERY PRO | 157721. | 278715. | 21302. | .0135 | .0184 | 21302. | .0135 |
| 20 | ALCH. BEV. | 643635. | 853820. | 662286. | .1029 | .0015 | 681674. | .1059 |
| 21 | MISC. FOOD | 684210. | 171067. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 22 | TEXTILE GO | 704021. | 114736. | 72920. | .0104 | .0004 | 73838. | .0105 |
| 23 | APPAREL, F | 878368. | 659266. | 283692. | .0323 | .0021 | 286234. | .0326 |
| 24 | LOGGING | 199780. | 1102757. | 123672. | .0619 | .0000 | 134578. | .0674 |
| 25 | SAWMILLS | 177610. | 345300. | 22677. | .0128 | -.0003 | 25967. | .0146 |
| 26 | PARTICLEBO | 29460. | 1089214. | 1071742. | 3.6379 | .0025 | 1129635. | 3.8344 |
| 27 | OTHER WOOD | 261728. | 769725. | 543848. | .2078 | .0002 | 550746. | .2104 |
| 28 | FURNITURE | 299509. | 57639. | -435. | -.0001 | -1.1811 | 368. | .0001 |
| 29 | PULP & PAP | 660860. | 7499459. | 7180952. | 1.0866 | .0000 | 7319432. | 1.1076 |
| 30 | PAPERBOARD | 243558. | 83320. | -188. | -.0001 | 0.0000 | 0. | 0.0000 |
| 31 | PRINTING & | 932992. | 144851. | -406380. | -.0436 | -.0016 | 103571. | .0111 |
| 32 | CHEM. & AL | 2296198. | 893825. | 417003. | .0182 | .0004 | 424521. | .0185 |
| 33 | PETR. REF. | 896511. | 680547. | -1556241. | -.1736 | .0213 | -348528. | -.0389 |
| 34 | RUBBER PRO | 822383. | 87671. | -157. | -.0000 | -.1270 | 0. | 0.0000 |
| 35 | LEATHER PR | 108869. | 2149. | -17. | -.0000 | -.5478 | 0. | 0.0000 |
| 36 | GLASS, STO | 561880. | 853520. | 513456. | .0914 | .0002 | 521605. | .0928 |
| 37 | PRIMARY FE | 704082. | 413017. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 38 | IRON & STE | 239431. | 205223. | 58101. | .0243 | -.0001 | 59180. | .0247 |
| 39 | PRIMARY CO | 322321. | 3928. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 40 | OTHER PRIM | 524684. | 51997. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 41 | FABRICATED | 1383053. | 719738. | 331561. | .0240 | .0004 | 338032. | .0244 |
| 42 | FARM MACHI | 270377. | 313773. | 168781. | .0624 | -.0041 | 172271. | .0637 |
| 43 | MACHINE SH | 152593. | 36640. | -133. | -.0001 | -.0573 | 0. | 0.0000 |
| 44 | OTHER NON. | 1490805. | 938410. | 186613. | .0125 | -.0001 | 199306. | .0134 |
| 45 | COMP., OFF | 803393. | 0. | -102527. | -.0128 | -.0118 | 0. | 0.0000 |
| 46 | SERV. IND. | 225273. | 64390. | -365. | -.0002 | -.0396 | 0. | 0.0000 |
| 47 | ELECTRICAL | 2022268. | 297583. | -1739. | -.0001 | -.1337 | 0. | 0.0000 |
| 48 | MOTOR VEHI | 2275945. | 187728. | -2838. | -.0001 | .0768 | 0. | 0.0000 |
| 49 | OTHER TRAN | 1240388. | 87117. | -820. | -.0001 | -.2464 | 0. | 0.0000 |
| 50 | PROF., SCI | 287498. | 27981. | -66. | -.0000 | -.1422 | 0. | 0.0000 |
| 51 | OPTICAL, O | 277212. | 51873. | 5748. | .0021 | .0059 | 5808. | .0021 |
| 52 | MISC. MFG. | 312881. | 279762. | 93950. | .0300 | .0015 | 94500. | .0302 |
| 53 | RAILROAD T | 365963. | 1979739. | 1432709. | .3915 | .0002 | 1455294. | .3977 |
| 54 | LOCAL TRAN | 127184. | 78339. | -91. | -.0001 | -.1963 | 0. | 0.0000 |
| 55 | TRUCK TRAN | 723507. | 288829. | -395. | -.0001 | -.1718 | 0. | 0.0000 |
| 56 | AIR TRANS. | 604889. | 111013. | -1. | -.0000 | -.7219 | 0. | 0.0000 |
| 57 | OTHER TRAN | 361358. | 145026. | -217. | -.0001 | -.1373 | 0. | 0.0000 |
| 58 | COMMUNICAT | 2283905. | 960091. | 229450. | .0100 | .0050 | 232958. | .0102 |
| 59 | ELECTRIC U | 1223832. | 2176705. | 528278. | .0432 | .0025 | 534533. | .0437 |
| 60 | GAS UTILIT | 425460. | 854112. | -634. | -.0001 | -.1855 | 0. | 0.0000 |
| 61 | WATER & SA | 81372. | 212043. | 85445. | .1050 | .0017 | 86237. | .1060 |
| 62 | WHOLESALE | 3217483. | 2140043. | -712. | -.0000 | -.3687 | 0. | 0.0000 |
| 63 | RETAIL TRA | 3134743. | 4806628. | 948887. | .0303 | .0239 | 948887. | .0303 |
| 64 | FINANCE, I | 2237051. | 1440334. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 65 | REAL ESTAT | 4744410. | 4976256. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 66 | HOTELS, PE | 600332. | 374047. | -327410. | -.0545 | .0318 | 201405. | .0335 |
| 67 | BUSINESS S | 2461456. | 1061086. | -954. | -.0000 | -.2139 | 0. | 0.0000 |
| 68 | EAT.&DRINK | 1437406. | 2092008. | 483989. | .0337 | .0099 | 483989. | .0337 |
| 69 | AUTOMOBILE | 877636. | 638319. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 70 | MOTION PIC | 492377. | 178167. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 71 | HEALTH SER | 2352176. | 1900076. | -488362. | -.0208 | -11.4696 | 950608. | .0404 |
| 72 | EDUC., NON | 758840. | 771005. | 85605. | .0113 | .0204 | 85605. | .0113 |
| 73 | FED. GOV'T | 301678. | 268046. | 0. | 0.0000 | 0.0000 | 0. | 0.0000 |
| 74 | STATE & LO | 364086. | 467283. | -167. | -.0000 | -.3802 | 0. | 0.0000 |
| 75 | SCRAP, USE | 29604. | 3685193. | 0. | ======= | 0. | 0.0000 | |
| | TOTAL | 61418367. | 69284263. | 25782926. | .0042 | 0.0000 | 31975428. | .0052 |

TABLE 9 UNEMPLOYMENT AND EMPLOYMENT IN SPECIFIED INDUSTRIES, BY OCCUPATION
ARROWHEAD , 2000

| NO. | INDUSTRY TITLE | PROFESSIONAL | MANAGERIAL | SALES WORKER | CLERICAL | CRAFTS | OPERATIVES | NONFARM NONMINE SERVICE | FARM | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) | (NO.) |
| 1 | DAIRY & PO | 73. | 19. | 20. | 21. | 26. | 73. | 179. | 8. | 1466. | 1886. |
| 2 | MEAT AN. & | 5. | 1. | 1. | 1. | 2. | 5. | 11. | 1. | 93. | 120. |
| 3 | FOOD, FEED | 7. | 2. | 2. | 2. | 3. | 7. | 18. | 1. | 146. | 187. |
| 4 | OTHER CROP | 11. | 3. | 3. | 3. | 4. | 11. | 26. | 1. | 214. | 275. |
| 5 | FOREST., F | 0. | 0. | 0. | 0. | 0. | 1. | 1. | 0. | 14. | 17. |
| 6 | AGR.,FOR., | 6. | 2. | 2. | 2. | 2. | 6. | 14. | 1. | 121. | 155. |
| 7 | IRON & FER | 1018. | 503. | 11. | 521. | 3233. | 3696. | 0. | 181. | 0. | 9164. |
| 8 | NONFERROUS | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 9 | COAL & PEA | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 10 | STONE,CLAY | 13. | 7. | 1. | 16. | 9. | 19. | 3. | 2. | 0. | 71. |
| 11 | OTHER MINI | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 12 | NEW CONSTR | 120. | 166. | 25. | 158. | 1405. | 243. | 593. | 2032. | 0. | 4743. |
| 13 | MAIN. & RE | 284. | 141. | 844. | 11. | 179. | 446. | 193. | 55. | 0. | 2153. |
| 14 | ORDNANCE | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 15 | MEAT PRODU | 19. | 28. | 7. | 30. | 23. | 71. | 10. | 18. | 0. | 205. |
| 16 | DAIRY PROD | 42. | 60. | 17. | 57. | 61. | 139. | 21. | 37. | 0. | 434. |
| 17 | CANNED,FRO | 5. | 7. | 2. | 8. | 5. | 17. | 2. | 5. | 0. | 51. |
| 18 | GRAIN MILL | 3. | 4. | 1. | 4. | 3. | 10. | 2. | 2. | 0. | 27. |
| 19 | BAKERY PRO | 39. | 50. | 13. | 56. | 44. | 146. | 22. | 35. | 0. | 405. |
| 20 | ALCH. BEV. | 30. | 47. | 12. | 41. | 36. | 113. | 17. | 22. | 0. | 317. |
| 21 | MISC. FOOD | 7. | 9. | 2. | 10. | 9. | 28. | 3. | 5. | 0. | 74. |
| 22 | TEXTILE GO | 19. | 12. | 2. | 16. | 21. | 42. | 2. | 5. | 0. | 119. |
| 23 | APPAREL, F | 219. | 113. | 22. | 154. | 220. | 558. | 29. | 49. | 0. | 1364. |
| 24 | LOGGING | 15. | 19. | 10. | 27. | 43. | 100. | 13. | 25. | 0. | 251. |
| 25 | SAWMILLS | 10. | 20. | 8. | 24. | 37. | 69. | 7. | 12. | 0. | 187. |
| 26 | PARTICLEBO | 23. | 46. | 18. | 56. | 85. | 159. | 16. | 28. | 0. | 430. |
| 27 | OTHER WOOD | 25. | 50. | 19. | 61. | 92. | 172. | 17. | 30. | 0. | 466. |
| 28 | FURNITURE | 4. | 5. | 3. | 8. | 14. | 22. | 3. | 4. | 0. | 64. |
| 29 | PULP & PAP | 690. | 313. | 57. | 632. | 334. | 467. | 297. | 97. | 0. | 2888. |
| 30 | PAPERBOARD | 25. | 12. | 2. | 17. | 12. | 17. | 12. | 4. | 0. | 101. |
| 31 | PRINTING & | 23. | 16. | 14. | 52. | 153. | 48. | 14. | 16. | 0. | 336. |
| 32 | CHEM. & AL | 122. | 64. | 15. | 120. | 41. | 69. | 56. | 10. | 0. | 498. |
| 33 | PETR. REF. | 41. | 21. | 5. | 36. | 27. | 35. | 10. | 6. | 0. | 182. |
| 34 | RUBBER PRO | 27. | 3. | 2. | 10. | 21. | 52. | 6. | 5. | 0. | 127. |
| 35 | LEATHER PR | 1. | 0. | 0. | 1. | 1. | 2. | 0. | 0. | 0. | 6. |
| 36 | GLASS, STO | 112. | 57. | 16. | 101. | 107. | 211. | 29. | 37. | 0. | 671. |
| 37 | PRIMARY FE | 1. | 8. | 1. | 11. | 66. | 51. | 19. | 7. | 0. | 164. |
| 38 | IRON & STE | 1. | 7. | 1. | 9. | 58. | 47. | 17. | 5. | 0. | 144. |
| 39 | PRIMARY CO | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 1. |
| 40 | OTHER PRIM | 0. | 1. | 0. | 1. | 6. | 4. | 2. | 0. | 0. | 13. |
| 41 | FABRICATED | 34. | 22. | 12. | 41. | 123. | 220. | 19. | 17. | 0. | 489. |
| 42 | FARM MACHI | 59. | 14. | 2. | 18. | 31. | 42. | 2. | 6. | 0. | 174. |
| 43 | MACHINE SH | 14. | 4. | 0. | 4. | 7. | 10. | 0. | 1. | 0. | 42. |
| 44 | OTHER NON. | 195. | 52. | 7. | 60. | 101. | 132. | 5. | 19. | 0. | 573. |
| 45 | COMP., OFF | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 46 | SERV. IND. | 14. | 4. | 0. | 4. | 7. | 9. | 0. | 1. | 0. | 40. |
| 47 | ELECTRICAL | 58. | 25. | 3. | 26. | 36. | 64. | 2. | 7. | 0. | 221. |
| 48 | MOTOR VEHI | 9. | 3. | 1. | 4. | 6. | 20. | 1. | 3. | 0. | 48. |
| 49 | OTHER TRAN | 9. | 3. | 1. | 5. | 7. | 23. | 1. | 2. | 0. | 52. |
| 50 | PROF., SCI | 5. | 2. | 0. | 3. | 4. | 11. | 1. | 1. | 0. | 28. |
| 51 | OPTICAL, O | 4. | 2. | 0. | 2. | 4. | 9. | 1. | 1. | 0. | 23. |
| 52 | MISC. MFG. | 42. | 19. | 4. | 28. | 42. | 97. | 5. | 12. | 0. | 248. |
| 53 | RAILROAD T | 174. | 230. | 6. | 901. | 449. | 282. | 80. | 51. | 0. | 2173. |
| 54 | LOCAL TRAN | 12. | 46. | 3. | 24. | 40. | 49. | 2. | 28. | 0. | 204. |
| 55 | TRUCK TRAN | 27. | 74. | 10. | 161. | 99. | 493. | 73. | 14. | 0. | 952. |
| 56 | AIR TRANS. | 7. | 19. | 1. | 8. | 23. | 29. | 1. | 12. | 0. | 100. |
| 57 | OTHER TRAN | 12. | 48. | 3. | 25. | 51. | 50. | 2. | 23. | 0. | 215. |
| 58 | COMMUNICAT | 131. | 75. | 18. | 465. | 203. | 12. | 2. | 6. | 0. | 910. |
| 59 | ELECTRIC U | 113. | 90. | 10. | 149. | 391. | 113. | 42. | 24. | 0. | 932. |
| 60 | GAS UTILIT | 55. | 42. | 10. | 89. | 169. | 58. | 44. | 5. | 0. | 473. |
| 61 | WATER & SA | 5. | 10. | 0. | 7. | 31. | 36. | 80. | 1. | 0. | 169. |
| 62 | WHOLESALE | 421. | 859. | 582. | 955. | 427. | 733. | 181. | 113. | 0. | 4271. |
| 63 | RETAIL TRA | 849. | 2490. | 3391. | 3617. | 2007. | 2276. | 934. | 4996. | 0. | 20560. |
| 64 | FINANCE, I | 354. | 754. | 586. | 1632. | 48. | 13. | 16. | 129. | 0. | 3532. |
| 65 | REAL ESTAT | 169. | 372. | 299. | 728. | 28. | 7. | 8. | 82. | 0. | 1694. |
| 66 | HOTELS, PE | 168. | 164. | 37. | 370. | 152. | 395. | 13. | 1050. | 0. | 2349. |
| 67 | BUSINESS S | 1452. | 217. | 82. | 931. | 190. | 338. | 30. | 287. | 0. | 3528. |
| 68 | EAT.&DRINK | 463. | 1497. | 2062. | 2365. | 1135. | 1395. | 624. | 2601. | 0. | 12143. |
| 69 | AUTOMOBILE | 778. | 109. | 11. | 362. | 164. | 76. | 47. | 408. | 0. | 1956. |
| 70 | MOTION PIC | 315. | 39. | 4. | 147. | 50. | 35. | 15. | 149. | 0. | 755. |
| 71 | HEALTH SER | 6923. | 623. | 45. | 504. | 181. | 210. | 31. | 1729. | 0. | 10246. |
| 72 | EDUC., NON | 2546. | 212. | 20. | 817. | 96. | 92. | 16. | 1425. | 0. | 5225. |
| 73 | FED. GOV'T | 170. | 103. | 1. | 385. | 85. | 31. | 50. | 21. | 0. | 846. |
| 74 | STATE & LO | 243. | 256. | 4. | 275. | 89. | 39. | 71. | 314. | 0. | 1291. |
| 75 | SCRAP, USE | 15759. | 2703. | 35. | 9196. | 983. | 526. | 491. | 5405. | 0. | 35098. |
| | TOTAL | 34630. | 12999. | 8410. | 26588. | 13842. | 15084. | 4556. | 21692. | 2054. | 139855. |
| | UNEMPLOYMENT | 4358. | 932. | 208. | 1190. | 1676. | 1971. | 236. | 2444. | 248. | 13262. |

Table 10: Selected Gross Output and Employment - Intermediate Year Totals, Modified Run 1977-2000

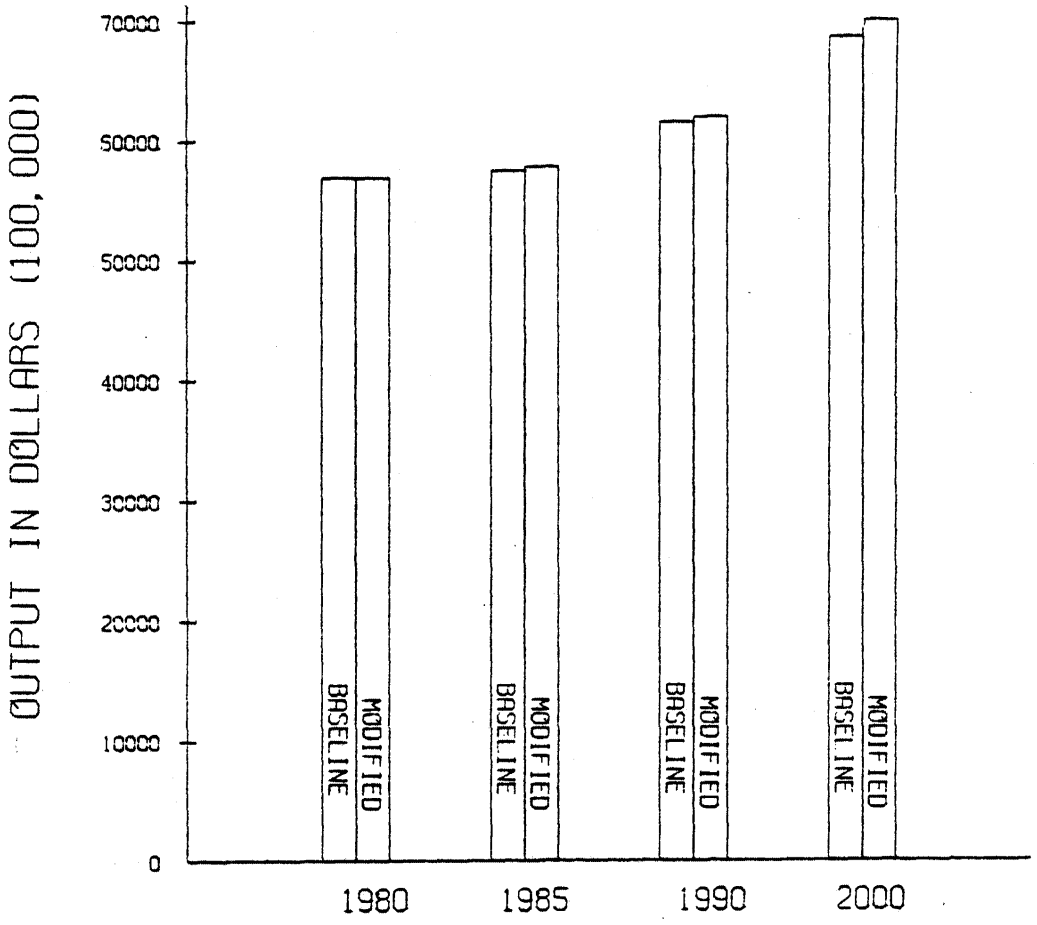
| Year | U.S. Gross Output (100,000) | Regional Output (100) | Regional Employment (No) |
|---|---|---|---|
| 1977 | $33,457,093 | $57,860,550 | 142,906 |
| 1980 | 35,556,739 | 56,913,284 | 133,722 |
| 1985 | 40,297,640 | 57,545,102 | 137,201 |
| 1990 | 46,214,048 | 61,674,387 | 139,912 |
| 2000 | 61,418,367 | 69,284,263 | 139,855 |

Table 11: Regional Output and Employment Comparisons

| Year | Baseline Output (100) | Regional Output (100) | Baseline Empl. | Revised Empl. |
|---|---|---|---|---|
| 1980 | $56,915,284 | $56,915,284 | 133,722 | 133,722 |
| 1985 | 57,522,939 | 57,545,102 | 137,175 | 137,207 |
| 1990 | 61,545,370 | 61,674,287 | 139,652 | 139,912 |
| 2000 | 68,680,262 | 69,284,263 | 138,817 | 139,855 |

CHART 1

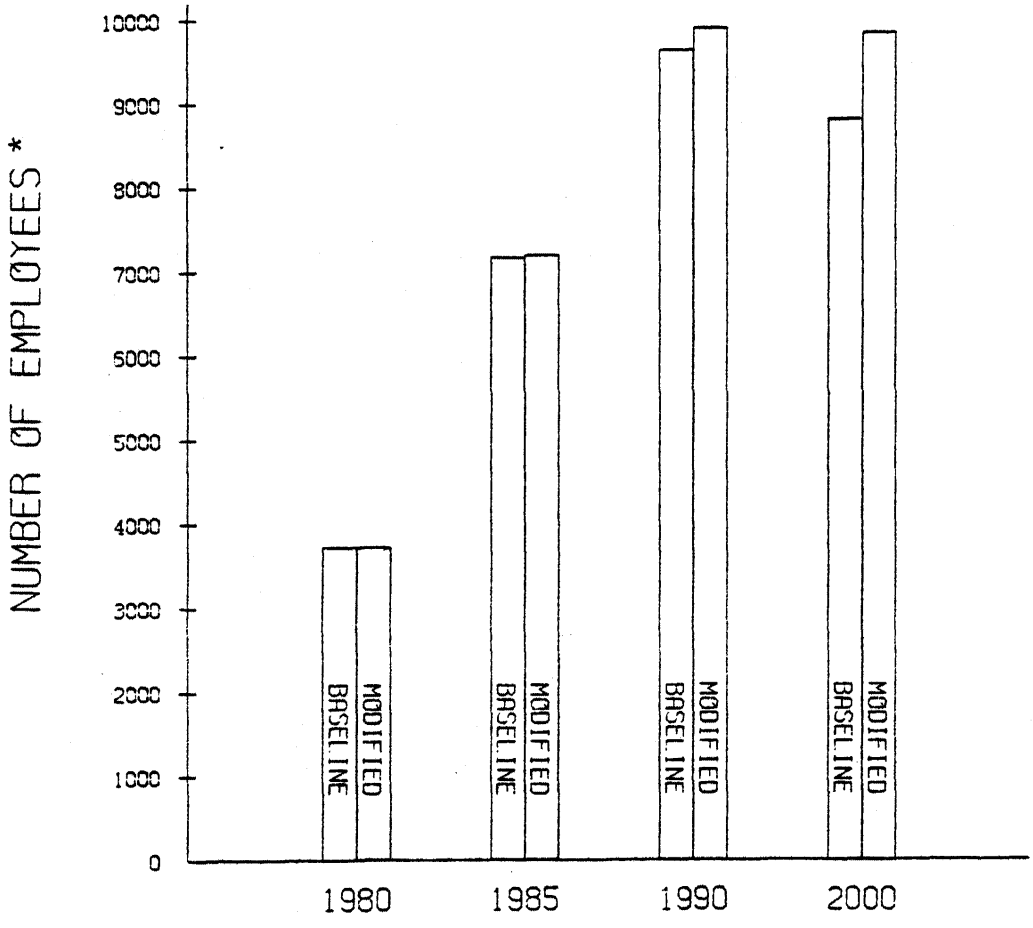
COMPARISON OF REGIONAL OUTPUT




5-YEAR BASELINE AND MODIFIED OUTPUT

CHART 2

COMPARISON OF REGIONAL EMPLOYMENT




5-YEAR BASELINE AND MODIFIED EMPLOYMENT

*Add 130,000 to scale

review of the individual sector employment totals from Tables 6 and 9 shows those industries which are affected significantly by this increased economic activity in the waferboard industry. Both Wholesale and Retail Trade experience strong gains in employment, as do the service industries (Business, Personal, Auto, Health, Education). Smaller but still significant employment gains show up in the Finance, Insurance Sector, the Transportation industries and the Chemical Products sector. As was mentioned earlier, the expansion in the Construction industries which go hand in hand with the increased waferboard industry were not incorporated into this simulation. As a result, the changes in the two construction sectors (12, 13) are of a smaller magnitude in the modified run than they would otherwise be. However, given its input/output basis and the constraints built into it, SIMLAB forces the user to be consistent when making changes. In other words, an increase in one area must be supported by increased activity elsewhere. Therefore, while the construction sectors themselves do not show the complete amount of change, a good portion of the increase is being shown in other industries, particularly the scrap category, Sector 75. Perhaps the most interesting results are shown in Table 11, where the changes after adding the waferboard are shown in regional totals for 5-year intervals through 2000.

In the modified run, total employment for the region in the year 2000 is 139,855 as compared to a figure of 138,812 in the baseline run. This amounts to an increase in employment for the region of 1,038 jobs stemming directly and indirectly from an expanded waferboard industry. An increase of over 1,000 jobs as a result of adding one large waferboard plant seems surprisingly large at first, but after examining the underlying characteristics of this industry and its relationship to the regional economy as evidenced by certain economic variables, such an increase is entirely plausible. Waferboard shows both a

large industrial multiplier relative to other industries in the region and it interacts with other industries that are generally labor intensive in their production techniques.

Turning away from employment indicators for the time being, the reader will also note the rather substantial increases in total regional output shown in Table 11. In the baseline, regional output rises from $5,752,293,900 in 1985 to $6,868,026,200 in the year 2000. With the waferboard expansion, however, regional output increases to $6,928,426,300 in 2000, a difference of $60,400,100. If one uses Gross Regional Output as an indicator of overall economic activity, then obviously there are some significant multiplier effects occurring as a result of the plant addition. Table 12 shows differences in regional output for various key industries in the year 2000.

Looking at Wood Products, the plant addition in 1985 translates into an increase in output of 27,022,800 for the particleboard industry over and above the level of output without the new plant. As one might expect, both logging and sawmills benefit substantially as well. For the wood products industry as a whole, modified output increased by $29,482,100 over the baseline output in the year 2000. Construction, transportion, utilities, and the trade sectors all show large increases as well. In particular, Wholesale and Retail Trade exhibit strong growth in output amounting to $6,174,600 after modification.

The 75-sector input/output table* which serves as the basis for SIMLAB, shows sector 26 to have an output multiplier of 1.48 which is above average for most of the other industries. When the output multiplier is calculated using the baseline and modified SIMLAB run, it is approximately 2.24. This is higher than the raw input/output multiplier because SIMLAB is much more than an input/output model; it takes into account all levels of demand including personal consumption along with other changes in final demand related to changing industry requirements, such as investment.

TABLE 12: REGIONAL OUTPUT COMPARISONS FOR SELECT INDUSTRIES IN THE YEAR 2000

| Industry(s) (sectors) | Baseline Output (100) | Modified Output (100) | Increase (100) |
|---|---|---|---|
| Construction (12-13) | $5,573,053 | $5,591,989 | $18,936 |
| Wood Products (24-30) | | | |
| Logging | 1,096,169 | 1,102,757 | 6,588 |
| Sawmills | 330,189 | 345,300 | 15,111 |
| *Particleboard | 819,186 | 1,089,214 | *270,028 |
| Other Wood Products | 768,005 | 769,725 | 1,720 |
| Furniture | 57,388 | 57,639 | 251 |
| Pulp and Paper | 7,498,570 | 7,499,459 | 889 |
| Paperboard | 83,086 | 83,320 | 234 |
| Total | 10,652,593 | 10,947,414 | 294,821 |
| Transportation (53-57) | 2,591,456 | 2,602,946 | 11,490 |
| Utilities (58-61) | 4,174,695 | 4,202,951 | 28,256 |
| Trade | | | |
| (62) Wholesale | 2,116,111 | 2,140,043 | 23,932 |
| (63) Retail | 4,768,814 | 4,806,628 | 37,814 |

It is very evident then that the waferboard industry has a very extensive and significant impact on the region's economy. Table 13 highlights some of the alternative measures of economic activity that can be used to help identify areas of great impact. The addition of a waferboard plant and the associated changes in baseline parameters that make up the modified run resulted in significant increases in regional earnings, value added and local final demand. Earnings in the region rise from $2,133,649,600 to $2,148,097,800 while other value added in the region increased by $15,463,500. Local final demand shows a very large increase, but once again this is explained by the unusually large output and employment multipliers.

The multiplier effect has already been examined from numerous viewpoints to help identify and analyze the impact of this plant addition. It can also be broken down into demand and supply-side components to further uncover the effects on the regional economy. Tables 14-15 show the differences in both Intermediate Sales and Intermediate Purchases in the year 2000 for the baseline and modified runs. Concentrating on the Wood Products industries, it is interesting to note the overwhelming increase in intermediate purchases for the waferboard industry. Purchases amounted to $28,038,000 in 2000 under the baseline assumptions, while in the modified run, purchases increase to $37,280,100, a difference of $9,242,100. Considering the high multipliers which this industry exhibits, it can be seen why adding the waferboard plant has such a stimulating effect. It is also interesting to note that while logging exhibits only a small change in its demand (purchases) characteristics in the modified run, sawmills show large changes in both purchases ($815,500) and sales ($1,553,300). Logging, as one would expect, shows a much bigger increase in its

*See appendix for I/O explanation.

TABLE 13

COMPARISON OF SELECTED REGIONAL ECONOMIC INDICATORS FOR YEAR 2000

| NAME | BASELINE (100) | MODIFIED (100) | DIFF (100) |
|---|---|---|---|
| Earnings | $21,336,496 | $21,480,978 | $144,482 |
| Value Added | 14,316,437 | 14,471,072 | 154,635 |
| Local Final Demand | 25,309,932 | 25,528,670 | 218,738 |

sales, after the modification. Waferboard is not a widely used input in industrial processes and as such the sector does not have high intermediate sales. Tables 14 and 15 also contain the sales and purchase changes for various other sectors, which the reader can view at his discretion.

In summary then, an expansion of the waferboard industry in Northeast Minnesota has some very strong and far-reaching positive impacts on the region's economy. In particular, the industry exhibits very high employment multipliers, which when combined with the relatively labor intensive industries that are affected by the addition, produce strong gains in employment for the region. The industry is also characterized by high output multipliers which provide substantial benefits to all facets of economic activity in the region.

## THE MEANING OF THE RESULTS

The next question that might be asked is, "What does all ot this mean for the region?" In the first place, it is not meant to be an accurate reflection of the future state of the economy in northeast Minnesota in the year 2000. To change the parameters of a single industry would not necessarily reflect changes in the other industries in the region. That is precisely why the baseline run is so important to understanding the strengths of the system.

The baseline provides a growth path given the best-guess parameter values and relationships for the base year in the system. Until better information is obtained, this baseline represents a type of growth path for the region under those early assumptions. When the parameters for any one industry are changed, and a new growth path is obtained, the comparison between the baseline and the new growth path may be attributed to those parameter changes and the related influence of that industry on the economy.

TABLE 14

COMPARISON OF DEMAND AND SUPPLY SIDE INDICATORS IN THE YEAR 2000 - SELECTED SECTORS

Intermediate Purchases*

| Industry(s) (Sectors) | Baseline Purchases (100) | Modified Purchases (100) | Difference (100) |
|---|---|---|---|
| Construction (12-13) | $1,619,093 | $1,624,533 | $5,440 |
| Wood Products (24-30) | | | |
| Logging | 290,756 | 292,503 | 1,747 |
| Sawmills | 177,122 | 185,277 | 8,155 |
| Particleboard | 280,380 | 372,801 | 92,421 |
| Other Wood Products | 314,905 | 315,610 | 705 |
| Furniture | 18,211 | 18,290 | 79 |
| Pulp and Paper | 2,502,933 | 2,503,229 | 296 |
| Paperboard | 15,346 | 15,390 | 44 |
| Region Totals | 17,764,929 | 17,933,842 | 168,913 |

* These figures were taken from the fourth table in the series appearing in Table 1 of this report. It has been condensed here for highlighting purposes.

TABLE 15

COMPARISON OF DEMAND AND SUPPLY SIDE INDICATORS
IN THE YEAR 2000 - SELECTED SECTORS

Intermediate Sales*

| Industry(s) (sectors) | Baseline Sales (100) | Modified Sales (100) | Difference (100) |
|---|---|---|---|
| Construction (13 only) | $1,129,102 | $1,134,052 | $4,950 |
| Wood Products (24-30) | | | |
| Logging | 968,985 | 975,683 | 6,698 |
| Sawmills | 305,748 | 321,301 | 15,553 |
| Particleboard | 10,806 | 10,945 | 139 |
| Other Wood Products | 210,566 | 212,111 | 1,545 |
| Furniture | 1,377 | 1,396 | 19 |
| Pulp and Paper | 284,246 | 284,578 | 332 |
| Paperboard | 81,144 | 81,440 | 296 |
| Total | 1,862,872 | 1,887,454 | 24,582 |
| Chem. & Allied Prod. (32) | 427,958 | 452,094 | 24,136 |
| Transportation (53-57) | 855,552 | 864,624 | 9,072 |
| Utilities (58-61) | 2,253,910 | 2,275,697 | 21,787 |
| Trade | | | |
| Wholesale | 1,102,886 | 1,116,491 | 13,605 |
| Retail | 243,353 | 244,439 | 1,086 |
| Region Total | 17,804,682 | 17,972,667 | 167,985 |

* These figures were drawn from the second table in the series appearing in Table 1 on page 10. It has been condensed here for highlighting purposes.

In other words, the comparison between the baseline and the revised runs represents the effects from changes in conditions for that one industry on the rest of the economy and on the demographic make-up of the region. With over sixty-five parameters available for such changes, the user has the option of experimenting with a one-at-a-time type of scenerio development, or with a multiple change type of simulation run. At every point, these changes can be compared against an all other things being equal simulation run as a measure of industrial impacts on the region.

If the user wishes, and if the information can be obtained, all parameters may be changed to more closely reflect reality. Under such conditions, the SIMLAB system becomes a forecasting model for the region.

How accurate are the changes? As mentioned earlier in this report, the SIMLAB system is not a statistical model of the type generally looked at when dealing with econometric techniques. It does force one thing on the user that stochastic models do not, the requirement for consistency in results. The user is forced to explain the results of any simulation run, not only in terms of the economics of the change, but also in terms of the demographics and related variable values contained or computed in the system. In that sense, the system is a general equilibrium type of model that highlights the fact that everything depends on everything else in a functioning economy.

## APPENDIX I: WHAT IS INPUT/OUTPUT ANALYSIS?

An input output table represents a still picture of economic relationships between all producers and consumers of goods and services in an economic region. It demonstrates interaction between these industries in terms of their sales to and purchases from one another. It also shows the complicated relationship between goods consumed and the amount and mix of goods produced in the region. A change in the consumption for the output of one firm will be reflected, for example, in changes in that firm's demand for the intermediate products produced by other firms as well as changes in that firm's demand for labor, capital equipment and other resource inputs. This point can be clarified by means of a simple example of a hypothetical input output table.

Suppose that there are but three industrial sectors in the economy: (1) Agriculture; (2) Entertainment; and (3) Home Furnishings. These three industries buy intermediate products from one another for use in their own production and they sell some of their output as intermediate products to other firms and some as final products to consumers, governmental units, investment, or exports. In order to produce this output, each industry utilizes inputs or labor, capital equipment and land as well as inputs from other regions through imports. These sales and purchases are summarized in Table I-1.

Many of the complications have been removed from this example, but the basic structure is that of the most sophisticated of actual tables. Notice that the inputs (represented by the columns of the table) total for each industry equals the output (represented by the rows of the table) totals for each industry. This is an accounting type of identity which states that all outputs must be made of materials, resources and profits.

Table I-1 can be interpreted as follows: Agriculture, in order to produce a total output of $5,424, must utilize $100 of its own output, $50 of the output

from entertainment, $75 worth of the output of home furnishings, $5,000 worth of labor and other resources of production and $200 worth of imports from outside of the region. Agriculture sells $100 to itself, $700 to the entertainment industry, $000 to the home furnishings industry, and $4,625 to final sales. This interpretation can be similarly applied to the other industrial sectors.

Another table (Table I-2) can be derived from this Table I-1 if each entry in any given industry's column of the transactions table is divided by the total for the row of that same industry. The resulting number represents the dollar value of inputs required from the various industries to produce $1 worth of goods and services. All other entries may be read in the same way. This type of a table is described by the term "Direct Requirements" and it represents a production recipe for the various industries because it shows exactly what input configuration each industry requires to produce a dollar's worth of output.

There is one more table that is generally associated with an interindustry study. This table is an extension of Table I-2 in that it shows the total effect on all other regional industries resulting from an expansion or contraction in the demand for any reference producer's output. For example, if the final demand for home furnishings increases by $1, that sector would require (from Table I-2) $.009 worth of input from the entertainment industry, $.014 worth of input from the home furnishings industry, and so on.

The analysis does not end with these direct requirements, however. The $.009 increase in the home furnishings industry's purchases from the entertainment industry represents an increase in the demand for entertainment. In order to provide that $.009 worth of output, the entertainment industry must purchase resources from other industries. Each of the other industries will need, in turn, to expand their input purchases in order to fill their increased demand, and so it goes.

The composite of all of these rounds of effects can be obtained through the use of computer technology and is presented for this example in Table I-3. The totals at the bottom of each column represent the interindustry multipliers discussed earlier in the paper. Each element of the column represents the direct and indirect effect that the industry at the head of the column exerts on the industries for each row.

For example, for every $1,000 of final sales by the home furnishings industry, agriculture will find its direct and indirect sales increasing by $1.00, entertainment will find its direct and indirect sales increasing by $10.00 and home furnishings will find its output increasing by that $1,000 plus an additional $15, for a total interindustry impact of $1,026.

For a more complete exposition on input output analysis and its uses, see Emerson and Lamphear.

TABLE I-1

| | Agriculture | Entertainment | Home Furnishings | Final Sales | Total |
|---|---|---|---|---|---|
| Agriculture | 100 | 700 | 000 | 4,625 | 5,425 |
| Entertainment | 50 | 200 | 50 | 6,400 | 6,700 |
| Home Furnishings | 75 | 300 | 75 | 4,905 | 5,355 |
| Resource Inputs | 5,000 | 5,500 | 230 | 18,000 | 28,730 |
| Imports | 200 | 000 | 5,000 | 000 | 5,200 |
| Total Inputs | 5,425 | 6,700 | 5,355 | 33,930 | 51,410 |

TABLE I-2

| | Agriculture | Entertainment | Home Furnishings |
|---|---|---|---|
| Agriculture | .018 | .104 | .000 |
| Entertainment | .009 | .030 | .009 |
| Home Furnishings | .014 | .045 | .014 |
| Resource Inputs | .922 | .821 | .043 |
| Imports | .037 | .000 | .934 |
| Total | 1.000 | 1.000 | 1.000 |

TABLE I-3

| | Agriculture | Entertainment | Home Furnishings |
|---|---|---|---|
| Agriculture | 1.019 | .109 | .001 |
| Entertainment | .010 | 1.032 | .010 |
| Home Furnishings | .015 | .049 | 1.015 |
| Total Inputs | 1.044 | 1.190 | 1.026 |

## REFERENCES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