

Research Note/Note de recherche

Saskatchewan Steel: A Regional Industrial Impact Analysis*

Jack C. Stabler and Larry V. St. Louis
Department of Economics, University of Saskatchewan
Saskatoon, Saskatchewan S7N 0W0

Introduction

During the 1950s the province of Saskatchewan experienced a difficult structural adjustment away from almost total dependence on agriculture as the basic employer. As late as 1950, 49 percent of the Saskatchewan labour force was directly engaged in the agricultural sector. Between 1951 and 1961 agriculture's share declined to 37 percent; however, while jobs were being created in other sectors, the overall rate of increase was insufficient to absorb both the labour released from agriculture and the new entrants into the labour force. Policy makers of the day were concerned not only with the slow rate of growth of the provincial economy but also with the continuing substantial reliance on agriculture. A number of initiatives were taken by the provincial government during the 1950s in attempts to both stimulate and diversify the economy. In this paper the impact of one of the major initiatives of the era, the creation of a steel rolling mill and fabricating plant near Regina, is analyzed. To conduct this study we develop a methodology, using input-output analysis, which we believe provides a more comprehensive means of post-project impact assessment than other alternatives of which we are aware.

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Background

The Market for Steel in Western Canada in the late 1950s

The major petroleum and natural gas fields of Alberta and Saskatchewan were brought into production during the 1950s. To facilitate this development and to transport the products to Canadian and U.S. markets, an enormous increase in the supply of steel pipe was required. In the late 1950s, steel pipe was manufactured in western Canada at mills located in Vancouver, Edmonton and Regina. The steel used in the manufacture of this pipe, called skelp, was obtained from eastern Canada, which supplied approximately one-half the Saskatchewan demand, and from the western U.S., which split the Saskatchewan market and was the primary supplier for Alberta and British Columbia. A secondary but rapidly growing regional demand for structural shapes, bars, sheets and plates occasioned by the growth of major urban areas, the building or replacing of highway bridges, and assorted industrial needs, was supplied by several small fabricators in Manitoba and Alberta, or by imports from fabricators in the western U.S. Western Canadian fabricators obtained their basic stock from the same rolling mills that supplied skelp for the pipe mills, either from eastern Canada or the U.S. (Stevenson and Kellogg 1957).

The 1957 Feasibility Study

In 1957 a group of Saskatchewan businessmen approached the provincial government seeking support to build a rolling mill and fabricating plant near Regina. The response was sufficiently encouraging for the group to engage two consultants to assist in evaluating the feasibility of their proposal. Empire Engineering Company of Pittsburgh was engaged to provide information on technical specifications, capital requirements, and operating costs, while Stevenson and Kellogg Limited of Vancouver performed the market analysis.

The Stevenson and Kellogg report was a classic example of a study in location analysis. Projected consumption of each of the major products under consideration was developed for markets in the four western provinces. Delivered prices from eastern Canadian and U.S. suppliers (including tariffs) were obtained for each market centre, and the transportation advantage from a Regina location determined. At this stage prairie markets looked very promising, but western B.C. markets, which could be served by water transportation, did not.

The economics of a rolling mill that could accommodate approximately one-half the prairie demand when operating at full capacity was then investigated. Positing the use of electricity as the power source and scrap as the raw material, and assuming the existing price

structure, it was concluded that such a facility could break even when operating at just under 50 percent capacity. At higher levels of output, profitability was ensured. The short run average cost curve for such a plant was sufficiently steep and the transport cost advantage great enough that serious challenge from eastern Canadian or western U.S. rolling mills could not be expected within the prairie region. (Financial Post 1960a; Stevenson and Kellogg 1957).

Provincial Support

The consultants' reports were encouraging enough to persuade the provincial cabinet to support the proposal (Cabinet Minute 1957). A loan guarantee in the amount of approximately one-half the value of the fixed assets was provided. The province's guarantee ensured additional private backing and provision of a line of credit. Other arrangements favourable to the initial development of the industry were also made.¹ For example, Saskatchewan Power, a Crown corporation, provided attractive rates on electricity as well as a ready market for pipe to extend its natural gas distribution system (Financial Post 1960a). A loan of \$270,000 was also provided from the province's Industrial Development Fund (Financial Post 1961).²

Purpose of the Study

One of the objectives of this paper is to present what we believe is an improved method for assessing the post-project impact of a medium or larger scale development on the economy in which it has been inserted. Numerous techniques such as economic base (Tiebout 1962), input-output (Jelavich 1984; Isard and Kuenne 1953; Miernyk *et al.* 1970; Miernyk and Sears 1974; Miller 1984; Miller 1957), and industrial complex analysis (Czamanski and Czamanski 1977; Isard *et al.* 1959) have been used to either project the impact of a new facility on, or to assess the importance of an existing industry or group of industries to, a regional economy. However, the conventional application of

¹While the rolling mill was still under construction, Interprovincial Steel, as it was then known, merged with Prairie Pipe Manufacturing Company of Regina to form Interprovincial Steel and Pipe Corporation (IPSCO). Following the merger, the integrated firm controlled approximately 30 percent of the steel pipe manufacturing capacity in the prairie provinces (Financial Post 1960b).

²Viewed in retrospect the provincial government's support appears both cautious and modest. A loan guarantee of one-half the value of salable assets plus a small loan were provided only after the reasonable prospect of commercial viability was established (Financial Post 1961). By mid-1965, provincial government guarantees had been reduced to approximately 40 percent of the initial amount (Financial Post 1965).

these techniques understates either the extent of the interindustry interaction or the amount of induced consumption expenditure, or both (Miller and Blair 1985, 330-340; Richardson 1985). Actual post-project evaluations of regional development initiatives are rare and, to our knowledge, no comprehensive method of assessment comparable to that presented in this paper exists.

Our second objective is to identify the composite impact on the Saskatchewan economy occasioned by the development of the steel industry at Regina.

Impact Analysis

Methodology

The technique utilized involves the development of two input-output tables. The first is a factual table descriptive of the economy with the subject industry in place. The second is a (counterfactual) table from which the subject industry has been removed. The difference between the two tables identifies the impact that the subject industry has had on the level of activity in the economy under study. It is the development of the counterfactual table, of course, that constitutes the major effort in this approach.

The counterfactual table is prepared in two stages. In the first, the subject industry's final demand is reduced to zero, and the consequent reduction in interindustry transactions and consumption spending is determined. In the second, intermediate demand for the subject industry's output and all remaining final payments by the subject industry are reduced to zero, and the additional induced reduction in interindustry transactions and consumption spending is calculated. In the illustration that follows we have explicitly assumed that products produced by the subject industry continue to be available to the economy. Forward linked industry and final demand purchases are satisfied through imports. Backward linked industry continues to operate but experiences a loss of sales to the subject industry. The steps in this procedure are defined below.

Conventional notation is utilized; however, it will be understood that all matrices and vectors are written with households endogenized.

X is the vector of gross outputs,

Z is the I/O transactions matrix, ex final demands,

F is the matrix of final demands, used here as a vector,

C is the consumption vector,

A is the direct coefficient matrix, and

P is a matrix of direct final payments coefficients.

A circumflex over a vector indicates that the vector is being written as a diagonal matrix. Numerical subscripts denote various transition stages (0 being the initial stage).

I. Effect of Reducing Subject Industry's Final Demand to Zero

In the first stage the direct, indirect, and induced effects of moving the subject industry's final demands into imports are measured.³ This is handled like any other change in final demand, except that the direct requirements matrix, with households endogenous, will alter with removal of the subject industry's consumption (and other final demands) to imports. Thus, the first step is to compute the gross outputs required to support the modified final demands; that is:

$$X_1 = [I - A_1]^{-1} \cdot [F_1 - C_1]$$

The second step is to generate the new transactions matrix, Z_1 , associated with the new gross outputs, X_1 :

$$Z_1 = [A_1/P_1] \hat{X}_1$$

A comparison of Z_0 and Z_1 reveals the impact of the removal of the subject industry's final demands. The difference between the household columns of these two matrices, for example, shows the direct, indirect and induced changes in consumption occasioned by the elimination of the subject industry's final demands.

II. Effect of Reducing Subject Industry's Intermediate Demand to Zero

In the following steps the subject industry's interindustry transactions and remaining final payments are reduced to zero and the resulting indirect and induced effects calculated.

The first step is to remove the subject industry's interindustry row and column. The subject industry's sales row is moved into imports. This does not change the production technology of any industries relying on the subject industry for inputs; rather, abstracting from any changes in transaction costs, it assumes that these industries remain in the economy and rely on imports. The subject industry's purchase column is removed to represent the direct loss of interindustry sales to the subject industry. The intersect is treated as a column entry.

³An amount equal to the consumption component of the subject industry's final demand is simultaneously removed from the household row of the transaction matrix and returned to final payments.

The second step is to reduce the (remaining) entries in the final payments column of the subject industry to zero. The resulting income loss will cause a direct reduction in consumption spending equal to $MCP(= ACP) \times$ the locally spent final payments of the subject industry. This reduction is distributed through the consumption column using the consumption coefficients of vector C_1 . Thus a new consumption vector $C_2 = C_1 - \Delta C$ is created.

A new direct requirements matrix, A_2 , and a new final payments coefficient matrix, P_2 , are then computed from the *interim* transactions matrix produced in steps 1 and 2 above. Using these new matrices, A_2 and C_2 , new gross outputs, X_2 , are produced in the usual fashion:

$$X_2 = [I - A_2]^{-1} \cdot [F_1 - C_2]$$

Thus the final transactions matrix, Z_2 , is generated:

$$Z_2 = [A_2/P_2] \hat{X}_2$$

A comparison of the initial I/O table, $[Z_0|F_0]$, and the final table, $[Z_2|F_2]$, identifies the composite contribution to the economy made by the subject industry.⁴

The procedure described above is comprehensive but conservative. It is comprehensive in that it has explicitly taken into account the direct and indirect effects of both final demand and interindustry purchases and sales by the subject industry as well as the direct, indirect and induced effects on consumption expenditures supported by these transactions. The procedure is conservative in that it assumes that linked sectors will continue to operate. Forward linked industries are assumed to obtain their inputs through imports, while backward linked industries, although assumed to continue in operation, will experience a loss of sales to the subject industry as previously indicated. Further, the assumption that other final demands (I, G, X) would remain unchanged after removal of the subject industry is conservative, as were our modifications to consumption spending. Obviously these assumptions could be replaced by others based on particular knowledge or alternative hypotheses.

Impact on the Saskatchewan Economy

The procedure described above was employed in assessing the impact that development of the steel rolling mill and fabricating plant has had on the Saskatchewan economy. Statistics Canada's standard provincial model, obtained by disaggregation of the table for the national economy, was utilized as the basic working model. In the Statistics Canada

⁴Several experiments with this procedure suggest that the order in which the above steps are performed is unimportant to the final result, even though the intermediate results may differ.

version, however, the province's steel industry was combined with several other industrial sectors. Thus a special 39-industry disaggregation of Statistics Canada's standard 1979 structural economic model of the Saskatchewan economy was obtained in which Interprovincial Steel and Pipe Corporation appears as an individual industry. Conventional forward and backward linkage multipliers as well as type I and type II income and employment multipliers were obtained from this table and provide the basis for the usual (incremental) impact analysis. These multipliers appear in Table 1. However, the structural changes associated with integrating IPSCO into the provincial economy could be expected to alter the magnitude of these conventional multipliers. In order to gain an indication of these changes, multipliers were derived from the I/O table(s) from which IPSCO had been extracted. This second set of multipliers was then subtracted from the set shown in Table 1. In Table 2 the percentage changes in the multipliers are recorded.

Positive entries in Table 2 indicate the increases in the size of individual multipliers as a result of the development of the iron and steel industry. As expected, the greatest changes are recorded for those industries most closely linked with the iron and steel industry. The four negative entries, all in the forward-linkage-multipliers column, are interesting anomalies. All are in industries in which consumption demand accounts for over 70 percent of total gross output. When IPSCO was extracted from the 1979 table, consumption demand for these industries fell by a proportionately larger amount than did interindustry demand. Thus, for these four sectors, interindustry demand rose in relative importance as IPSCO was removed, creating the negative signs. Although changes are recorded in the majority of the cells, none is very large. It is possible that the changes in the multipliers would be larger in an economy with a more mature manufacturing sector than that which presently exists in Saskatchewan.⁵

The composite impact, using the procedure described in the previous section, is described in Table 3, which represents the difference between the provincial economy with the steel industry and without it. This table has been reduced from the original 39 industries to 13 to avoid revealing information which could affect IPSCO's competitive position in the industry. IPSCO appears in row and column 13 as the iron and steel industry.

Several interesting observations can be made from Table 3. Since it is a table of differences, positive entries indicate the increased amount of activity attributable to IPSCO's presence, while negative entries (in the imports row) represent net import-substitution.

⁵Saskatchewan's manufacturing sector is smaller and less diversified than that of any province except Prince Edward Island (Census of Canada 1961; 1981).

Table 1
CONVENTIONAL MULTIPLIERS FOR 1979 SASKATCHEWAN I-O MODEL

	Linkages								
	FWD			Backward		Income		Employment	
	I	I	II	I	II	I	II		
Agriculture	1.18	1.21	1.41	1.14	1.37	1.13	1.35		
Forestry	2.15	1.40	1.59	1.33	1.59	1.34	1.64		
Fishing	1.03	1.09	1.21	1.15	1.38	1.16	1.44		
Metal Mines	1.07	1.18	1.25	1.47	1.75	1.51	1.87		
Mineral Fuels	1.12	1.49	1.56	5.44	6.51	4.15	5.13		
Non-Metal Mines	1.05	1.25	1.36	1.37	1.64	1.63	2.16		
Services to Mines	2.14	1.23	1.42	1.15	1.37	1.17	1.43		
Food and Beverages	1.16	1.67	1.85	2.56	3.07	2.99	3.64		
Rubber-Plastics-Leather	1.36	1.09	1.16	1.20	1.43	1.17	1.36		
Textiles	1.03	1.07	1.23	1.07	1.28	1.04	1.17		
Wood Industry	1.53	1.46	1.64	1.48	1.77	1.59	1.99		
Furniture and Fixtures	1.03	1.13	1.41	1.07	1.28	1.01	1.06		
Paper and Allied	1.09	1.32	1.41	1.53	1.83	2.10	2.81		
Printing and Publishing	1.81	1.21	1.53	1.12	1.34	1.12	1.40		
Metal Fabricating	1.57	1.14	1.35	1.11	1.33	1.09	1.31		
Machinery	1.09	1.15	1.35	1.13	1.35	1.16	1.49		
Transport Equipment	1.18	1.15	1.35	1.12	1.34	1.10	1.30		
Electrical Products	1.14	1.13	1.28	1.14	1.36	1.11	1.32		
Non-Metal Mineral Products	1.87	1.37	1.52	1.38	1.66	1.40	1.74		
Petroleum and Coal	1.61	1.26	1.29	2.24	2.68	1.92	2.30		
Chemicals & Chemical Products	1.34	1.26	1.36	1.46	1.75	1.20	1.33		
Miscellaneous Manufacture	1.27	1.16	1.38	1.10	1.32	1.08	1.24		
Construction	1.19	1.26	1.46	1.24	1.49	1.47	1.97		
Transport and Storage	1.29	1.29	1.47	1.28	1.54	1.26	1.53		
Communications	1.63	1.16	1.46	1.10	1.32	1.14	1.47		
Electric Power and Gas	1.53	1.11	1.23	1.12	1.33	1.12	1.42		
Wholesale Trade	1.29	1.20	1.47	1.11	1.33	1.11	1.40		
Retail Trade	1.22	1.21	1.52	1.11	1.32	1.07	1.25		
Owner-Occupied Dwellings*	—	—	—	—	—	—	—		
Other Finances	1.51	1.18	1.31	1.24	1.48	1.26	1.58		
Education and Health	1.01	1.16	1.54	1.07	1.28	1.01	1.05		
Amusement and Recreation	1.32	1.37	1.56	1.38	1.65	1.25	1.40		
Services to Business	1.50	1.26	1.49	1.18	1.41	1.11	1.26		
Accommodation and Food Services	1.11	1.32	1.57	1.19	1.42	1.13	1.29		
Other Personal Services	1.93	1.17	1.47	1.08	1.29	1.07	1.26		
Transport Margins*	—	—	—	—	—	—	—		
Office Operations and Lab*	—	—	—	—	—	—	—		
Travel-Advertising-Promotions*	—	—	—	—	—	—	—		
Iron and Steel (IPSCO)	1.18	1.23	1.40	1.26	1.51	1.30	1.65		

*Multipliers were not derived for these artificially constructed industries.

Table 2
PERCENTAGE CHANGES IN CONVENTIONAL MULTIPLIERS AS A RESULT OF THE DEVELOPMENT OF THE IRON AND STEEL INDUSTRY

	Linkages								
	FWD			Backward		Income		Employment	
	I	I	II	I	II	I	II		
Agriculture	0.05	0.01	0.27	—	0.30	0.01	0.30		
Forestry	0.09	0.01	0.23	0.01	0.30	0.01	0.33		
Fishing	0.02	0.02	0.19	0.02	0.32	0.02	0.37		
Metal Mines	0.02	0.04	0.14	0.09	0.38	0.08	0.43		
Mineral Fuels	0.07	0.07	0.16	0.19	0.49	0.18	0.52		
Non-Metal Mines	0.02	0.04	0.19	0.06	0.36	0.08	0.52		
Services to Mines	0.04	0.38	0.62	0.32	0.61	0.27	0.61		
Food and Beverages	0.03	—	0.17	—	0.30	—	0.33		
Rubber-Plastics-Leather	0.08	—	0.12	—	0.30	0.01	0.26		
Textiles	0.01	—	0.24	—	0.29	—	0.20		
Wood Industry	0.13	0.02	0.23	0.02	0.32	0.02	0.38		
Furniture and Fixtures	-0.01	0.25	0.58	0.14	0.43	0.02	0.10		
Paper and Allied	0.35	0.03	0.17	0.05	0.35	0.05	0.50		
Printing and Publishing	0.07	—	0.38	—	0.30	—	0.35		
Metal Fabricating	0.17	2.52	2.69	1.89	2.18	1.39	1.75		
Machinery	0.07	2.45	2.64	2.02	2.30	2.11	2.47		
Transport Equipment	0.07	1.86	2.07	1.47	1.76	1.04	1.39		
Electrical Products	0.05	1.70	1.92	1.74	2.03	1.22	1.58		
Non-Metal Mineral Products	0.13	0.04	0.21	0.05	0.35	0.05	0.38		
Petroleum and Coal	0.01	0.02	0.06	0.07	0.36	0.08	0.36		
Chemicals & Chemical Products	0.14	0.15	0.29	0.26	0.56	0.11	0.30		
Miscellaneous Manufacture	0.01	0.17	0.46	0.12	0.41	0.07	0.31		
Construction	0.08	0.29	0.52	0.25	0.54	0.32	0.76		
Transport and Storage	0.10	0.04	0.26	0.03	0.33	0.03	0.34		
Communications	0.05	0.01	0.38	—	0.30	—	0.40		
Electric Power and Gas	0.51	—	0.16	0.01	0.31	—	0.34		
Wholesale Trade	0.79	—	0.31	0.01	0.30	—	0.32		
Retail Trade	-0.03	—	0.37	—	0.30	—	0.25		
Owner-Occupied Dwellings*	—	—	—	—	—	—	—		
Other Finances	0.03	0.01	0.20	0.01	0.31	0.01	0.38		
Education and Health	—	—	0.46	—	0.30	—	0.06		
Amusement and Recreation	-0.04	0.01	0.23	—	0.30	—	0.19		
Services to Business	0.14	—	0.28	—	0.30	—	0.21		
Accommodation and Food Services	-0.01	—	0.29	—	0.30	—	0.23		
Other Personal Services	0.07	0.04	0.41	0.02	0.32	0.01	0.29		
Transport Margins*	—	—	—	—	—	—	—		
Office Operations and Lab*	—	—	—	—	—	—	—		
Travel-Advertising-Promotions*	—	—	—	—	—	—	—		

*Multipliers were not derived for these artificially constructed industries.

Table 3
 IMPACT OF INTERPROVINCIAL STEEL AND PIPE CORPORATION ON THE
 SASKATCHEWAN ECONOMY, 1979
 (thousands of dollars)

	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	I ₇	I ₈	I ₉	I ₁₀	I ₁₁	I ₁₂	I ₁₃	Total Int. Prod.	Consump- tion	Other F.D.	Exports	Total F.D.	Total Produc- tion
Agriculture	55	1	1340	1	0	0	0	8	112	0	58	5	1	1581	560	0	0	560	2141
Other Primary	16	34	223	83	4	0	107	9	9	3	5	4	297	795	133	0	0	133	927
Manufacturing	73	11	291	130	30	14	8	93	59	9	366	215	1604	2903	3476	0	0	3476	6378
Construction	32	38	23	2	81	43	136	23	861	152	32	8	473	1905	60	0	0	60	1965
Transportation	3	16	35	7	54	8	35	56	32	2	11	241	400	901	414	0	0	414	1315
Communications	11	1	24	6	18	62	18	164	161	66	82	65	220	898	1070	0	0	1070	1968
Other Utilities	21	12	49	2	11	10	9	57	161	20	62	6	3977	4396	1265	0	0	1265	5662
Wholesale Trade	17	4	42	37	9	4	2	45	15	3	36	143	6527	6885	745	0	0	745	7629
Retail Trade	13	2	11	23	12	16	4	26	21	7	74	301	123	635	11520	0	0	11520	12155
Finance	68	123	36	19	18	13	27	199	348	165	183	37	383	1617	2347	0	0	2347	3964
Services	3	6	20	40	24	50	13	70	46	34	126	490	340	1260	5074	0	0	5074	6335
Miscellaneous	39	31	139	30	22	23	54	259	202	90	220	7	1981	3098	230	0	0	230	3328
Iron and Steel	1	1100	5831	5234	115	0	0	75	0	0	53	52	2194	14656	32	1339	85352	86723	101379
Total Processing	352	1378	8066	5612	398	243	414	1085	2027	551	1307	1575	18521	41529	26927	1339	85352	113617	155146
Imports	455	-817	-3437	-4472	202	185	1115	1885	1046	403	1230	1604	44704	44104	19974	731	240	20945	65048
Labour Income	756	115	1287	592	364	1038	1093	3312	3933	820	2813	0	26653	42652	1735	3	0	1738	44390
Other Primary Inputs	579	251	462	232	351	502	3040	1348	5149	2191	984	149	11501	26861	4315	37	2250	6602	33464
Total Outlays	2141	927	6378	1965	1315	1968	5662	7629	12155	3964	6335	3328	101379	155146	52951	2110	87841	142902	298048

The overall impact on the economy can be viewed in several ways. At the most aggregate level, IPSCO's total production of \$101.4 million is seen to support a total production of \$298.0 million, a figure equal to approximately one percent of the provincial total gross output in 1979. An increase in consumption spending alone of nearly \$53 million is sustained by the direct and indirect effects of the iron and steel industry. Alternatively, viewed in an export-base context, IPSCO's exports are seen to support a total gross output approximately 3.5 times the magnitude of its export sales. From still another perspective, IPSCO's presence in the economy has led to a net increase in imports of \$65 million, substantially exceeding the net import substitution attributable to the firm. At the same time, however, IPSCO's exports alone exceed the net increase in imports by some \$20 million. Further, the extent of interindustry linkages appears greater than what might be expected on the basis of *a priori* reasoning alone. In the 39-industry (difference) matrix from which Table 3 was derived, there were substantial transactions (arbitrarily defined as greater than \$10,000) in 189 cells. As indicated in Table 3, these transactions include every sector of the economy at the one- and two-digit SIC level; that is, a substantial entry appears in each row and column of Table 3. A final perspective is obtained by observing that IPSCO's presence provides employment for 3271 persons, 1715 in the steel industry itself and 1556 elsewhere in the provincial economy. An industrial disaggregation of this employment is shown in Table 4.

Table 4
INDUSTRIAL DISAGGREGATION OF EMPLOYMENT* SUPPORTED BY
INTERPROVINCIAL STEEL AND PIPE CORPORATION, 1979

Agriculture	68	Other Utilities	80
Other Primary	9	Wholesale Trade	261
Manufacturing	94	Retail Trade	410
Construction	27	Finance	56
Transportation	32	Service	460
Communications	62	Miscellaneous	0
Government**	0	Iron and Steel	1715

*Household sector employment is distributed through the SIC categories in a fashion that makes it impossible to separately identify.

**Recall the assumption that final demand categories other than for consumption and for IPSCO remained unchanged.

The total employment change, using the methodology described earlier in the paper, produced the estimate that removal of IPSCO

would result in the loss of 3271 jobs. This may be compared with the estimate of total employment change of 2830 obtained by using the Type II employment multiplier for the iron and steel industry from Table 2. The difference between estimates is explained by the fact that the methodology presented in this paper accounts for structural change, whereas the conventional use of the Type II multiplier assumes an unchanged structure.

Conclusions

Conventional techniques utilized for impact analysis understate the extent of employment effects, interindustry interactions, the amount of induced consumption spending, or all three. In this paper we have presented an enhanced method of post-project impact assessment that fully incorporates the influence of induced changes on employment and on interindustry and consumption expenditures.

Our assessment of Interprovincial Steel and Pipe Corporation's impact on the Saskatchewan economy approximately 20 years after its initial development reveals an extensive network of direct and indirect linkages extending to every major sector of the provincial economy. Further, the total increase in employment and economic activity supported by IPSCO is greater than what would probably be inferred from *a priori* reasoning or the use of less comprehensive methods of analysis. The more precise measurement of this composite impact results from incorporating structural changes and from more completely capturing the effects of induced interindustry and consumption expenditures in the analysis.

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