

ANALYSIS OF THE ECONOMIC
IMPACT OF SAWMILLS AND
PULP AND PAPER MILLS IN
NOVA SCOTIA



by

K. L. Runyon

J. V. Stewart

M. R. C. Massie

R. M. Nacker

MARITIMES FOREST RESEARCH CENTRE

FREDERICTON, NEW BRUNSWICK

INFORMATION REPORT M-X-33

CANADIAN FORESTRY SERVICE

DEPARTMENT OF THE ENVIRONMENT

July, 1972

ANALYSIS OF THE ECONOMIC IMPACT OF SAWMILLS
AND PULP AND PAPER MILLS IN NOVA SCOTIA

by

K. L. Runyon
J. V. Stewart
M. R. C. Massie
R. M. Nacker

MARITIMES FOREST RESEARCH CENTRE
FREDERICTON, NEW BRUNSWICK

INFORMATION REPORT M-X-33

CANADIAN FORESTRY SERVICE
Department of the Environment

July 1972

(This is a joint report of the Maritimes Forest Research Centre,
Fredericton, N.B. and the Forest Economics Research Institute,
Canadian Forestry Service, Ottawa, Ont.)

FOREWORD

This is one of a series of background reports on the economic impact of forestry and forest industries in Nova Scotia. Other studies include analyses of: the resource; small woodland ownership; the logging sector, and the importance of forestry relative to other sectors.

The study has been conducted at the request of the Nova Scotia Department of Lands and Forests and the Nova Scotia Forest Products Association.

The authors are especially grateful to the sawmill operators, their employees, and the pulp and paper companies who provided information for this study. Special thanks are due to Mr. C. Edward Lloyd of the Nova Scotia Department of Lands and Forests and Mr. Aubrey Gilroy of the Nova Scotia Forest Products Association for their assistance in designing and conducting the sawmill interviews.

ABSTRACT

In this study, sawmills and pulp and paper mills were analysed to determine their impact on the Nova Scotia economy. Results show that in 1969, the sawmill industry (316 mills) used inputs valued at about \$25.8 million while the pulp and paper industry (five pulp and paper mills and one hardboard mill) used inputs valued at \$78.6 million. Value added made up about 41% or \$10.6 million of this input for sawmills and about 50% or \$39.2 million for pulp and paper mills.

Sawmills used about 42.3 million ft^3 of roundwood or about 240.3 million f.b.m. on a product basis. Pulp and paper mills used about twice this amount or 88.7 million ft^3 (about 1.04 million cords).

While employment in sawmills and pulp and paper mills was about the same (2261 in sawmills and 2080 in pulp and paper mills), total salaries and wages paid by sawmills amounted to only about half that paid by pulp and paper mills. Employment in sawmills was also considerably more seasonal than in pulp and paper mills.

Sawmill employees were found to have a relatively high average age, to have spent a considerable number of years in the mills, and to have few alternate occupations outside this or a related line of work. Consequently, it was felt that the mobility of these people was probably quite low and their real dependence on the mills was quite high.

Output of sawmills was estimated at about \$25 million. This was made up of about 87% lumber (by value), 9% chips, and the remainder was for products such as box shooks, laths, and ties. About 70% of the lumber was sold locally, that is, within Nova Scotia. Most of the remainder went to other parts of Canada, to the U.K., and to the U.S.A. Pulp and paper output amounted to \$78.6 million. This included newsprint, unbleached groundwood pulp, bleached sulphite pulp, groundwood pulp and paperboard, kraft pulp, and hardboard. Only about 3% of these products (by value) were estimated to have been sold in Nova Scotia.

Analysis of data from specially tabulated input-output tables for 1960 showed that in terms of employment and income indirectly generated, the differences between the sawmill and pulp and paper industries were

probably not too significant. In both industries, data for 1960 showed that for every person employed directly, about two persons were employed indirectly. Also for every \$1 paid out directly for salaries and wages, about \$2 was estimated to be paid out indirectly.

Analysis of investment, value of inputs, and output by sawmill size class showed that while there were substantial differences in absolute values by size class, there were few differences in these factors per unit of production. Probably the most significant factor showing the difference in impact of various sawmill size classes was the period of operation and employment. Data on operating period showed that mills in the three largest size classes (> 2000 M.f.b.m.) operated year-round. Mills in the size classes from 101-2000 M.f.b.m. operated on 7 to 9 months, and mills in the smallest class averaged only about 4 months operation.

CONTENTS

	<u>Page</u>
I. INTRODUCTION AND STATEMENT OF THE PROBLEM	1
II. OBJECTIVE AND SCOPE	3
III. PROCEDURE	4
A. DEFINITION OF SAWMILLS AND PULP AND PAPER MILLS	4
1. Definition of Sawmills	4
2. Definition of Pulp and Paper Mills	4
B. DEFINITION OF IMPACT AND CHOICE OF INDICATORS	5
1. Definition of Economic Impact	5
2. Choice of Impact Indicators	6
C. COLLECTION AND TABULATION DATA	7
IV. RESULTS	12
A. DIRECT IMPACT OF SAWMILLS IN NOVA SCOTIA	12
1. Basis for Estimates	12
2. Capital Investment in the Sawmill Industry	14
3. Inputs of the Sawmill Industry	15
4. Quantity and Value of Output of the Sawmill Industry	37
B. DIRECT IMPACT OF PULP AND PAPER INDUSTRY IN NOVA SCOTIA	50
1. History and Development of the Industry	52
2. Capital Investment in the Industry	53
3. Direct Impact of the Industry	54
C. INDIRECT IMPACT OF SAWMILLS AND PULP AND PAPER MILLS IN NOVA SCOTIA	64
1. Indirect Impact on Employment	66
2. Indirect Impact on Salaries and Wages	69
V. SUMMARY AND CONCLUSIONS	72
A. ECONOMIC IMPACT OF SAWMILLS COMPARED WITH PULP AND PAPER MILLS	72
1. Summary of Inputs	72
2. Summary of Output	75
3. Indirect Impact	75
B. ECONOMIC IMPACT BY SAWMILL SIZE CLASS	76
VI. REFERENCES	78
VII. APPENDICES	80

LIST OF FIGURES

	<u>Page</u>
1. Distribution of sawmills and pulp and paper mills in Nova Scotia, 1969, and sample size..	9
2. Monthly employment in the sawmill industry in Nova Scotia, 1969.	29
3. Units of chips produced by mill size class in Nova Scotia, 1969.	51
4. Number of employees in manufacturing operations by month in pulp and paper mills in Nova Scotia, 1969.	62

LIST OF TABLES

	<u>Page</u>
1. Sample survey of sawmills in Nova Scotia	8
2. Estimated lumber production for various size classes of sawmills in Nova Scotia, 1969	12
3. Estimated production of softwood, hardwood, and custom-sawn lumber by mill size class in Nova Scotia, 1969	14
4. Estimated capital investment by mill size class in Nova Scotia, 1969	16
5. Importance of inputs for sawmills in Nova Scotia by mill size class, 1969	
A. Inputs in dollar values	18
B. As percentages of the class totals	19
6. Value of inputs per M.f.b.m. of production in Nova Scotia by mill size class, 1969	21
7. Quantity and value of wood used (lumber scale) by mill size class in Nova Scotia, 1969	23
8. Responsibility for logging for the sample mills by mill size class in Nova Scotia, 1969	25
9. Percentage of logs used from different sources by mill size class in Nova Scotia, 1969	25
10. Average hauling distances and ranges for the sample mills by mill size class in Nova Scotia, 1969	26
11. Forest land owned and proportion with harvestable sawlogs for the sample mills by mill size class in Nova Scotia, 1969	26
12. Costs of harvesting and hauling of sawlogs for the sample mills by mill size class in Nova Scotia, 1969	28
13. Monthly employment by mill size class in Nova Scotia, 1969	30
14. Average annual salaries and wages paid per person by mill size class in Nova Scotia, 1969	31
15. Hourly earnings for selected occupations in the sawmill industry in Nova Scotia, 1969	32
16. Number of sawmill employees and sample size by mill size class in Nova Scotia, 1969	34

17. Number of employees in the sample by occupation	35
18. Summary of average monthly employment and percent of income for employees by mill size class in Nova Scotia, 1969	36
19. Estimated value (\$'000) of output and percentage of total by product and mill size class in Nova Scotia, 1969	38
20. Estimated volume and value of lumber output by mill size class in Nova Scotia, 1969	40
21. Estimated volume of softwood lumber planed by mill size class in Nova Scotia, 1969	41
22. Estimated volume and value of softwood lumber sold in Nova Scotia and exported by mill size class, 1969	43
23. Estimated volume of softwood lumber sold in Nova Scotia by destination and mill size class, 1969	44
24. Estimated value of softwood lumber sales in Nova Scotia by destination and mill size class, 1969	46
25. Estimated volume of softwood lumber exported from Nova Scotia by geographic destination and by mill size class, 1969	47
26. Estimated value of softwood lumber exported by destination and mill size class, 1969	48
27. Estimated volume and value of chips produced by mill size class in Nova Scotia, 1969	50
28. Output capacity and investment of pulp and paper mills in Nova Scotia, 1965	54
29. Summary of the inputs of pulp and paper mills in Nova Scotia, 1969	56
30. Value of fuel and electricity inputs into pulp and paper mills in Nova Scotia, 1969	57
31. Volume, value, and origin of wood used by pulp and paper mills in Nova Scotia, 1969	58
32. Employment and wages in pulp and paper mills in Nova Scotia, 1969	61
33. Comparative summary of inputs of pulp and paper mills in Nova Scotia, 1969, and Ontario, 1966	63

34. Capacity and output of the pulp and paper mills in Nova Scotia, 1969	64
35. Direct and indirect employment per \$1 million of output for selected industries in Nova Scotia, 1960	67
36. Direct and indirect salaries and wages per \$1000 of output for selected industries in Nova Scotia, 1960	70
37. Comparative summary of the direct economic impact of sawmills and pulp and paper mills in Nova Scotia, 1969	73
38. Estimated employment and inputs per 1 million ft ³ of roundwood used by sawmills and pulp and paper mills in Nova Scotia, 1969	74

I. INTRODUCTION AND STATEMENT OF THE PROBLEM

In recent years, governments have increasingly assumed responsibility for the management of forest land, wildlife, and water. This has resulted in part because of continuing pressure for improvement in living standards, recognition of the variety of benefits particularly indirect and extra-market benefits accruing from resource development, and the increasing competition for these resources.

Increasing responsibility of governments is likewise more evident in industrial development. This can be seen from the variety of assistance schemes including grants for modernization of plants, tax holidays, and government-sponsored technical assistance programs. This expanding influence of governments has in turn made it necessary to review periodically how resources (in part forest land and timber) are being allocated or used and what the resultant benefits are. As demands change, policies must change if maximum net benefits are to be realized.

This is the context in which the Government of Nova Scotia, as well as most other provincial governments, is placed in relation to forest resource and industry development. Resources are limited. How can they be developed and how should they be distributed? How should the forest industry develop? Answers to these questions obviously depend to a large extent on the consequences or impact on the welfare of the province of various allocation schemes and development programs.

Sawmills and pulp and paper mills are the major users of wood for commercial purposes. Small quantities are also used for pit props, poles and piling, and veneer.

The declining importance of the sawmill industry in recent years has been attributed to the declining quality and quantity of sawlogs. This in turn is said to be due in part to the expansion and increasing competition of the pulp and paper industry. In his opening remarks to the Voluntary Economic Planning Conference in 1963, G.I. Smith (1963) stated, "It is at once apparent that one question which must be resolved is whether some policy should be formulated as to the proportion of cut which should go into sawlogs and into pulpwood". He further questioned whether there should be changes in the industry structure; that is, whether there should be fewer larger mills or whether small portable mills should be encouraged.

Knowledge of the economic impact of sawmills and pulp and paper mills is an important part of the information that is required to answer these questions.

The question of primary concern in this report is: What is the contribution or impact of sawmills and pulp and paper mills in Nova Scotia given the qualitative and quantitative status of the resource and the current pattern of utilization? And, specifically: Does economic impact vary between pulp and paper mills and sawmills? Does impact vary in the sawmill industry by size of mill or type of mill? What are the characteristics of sawmill employees and how dependent are they on sawmills?

II. OBJECTIVE AND SCOPE

The purpose of this report is to provide some perspective on the role or impact of sawmills and pulp and paper mills in the provincial economy. Having determined the status and availability of the timber resources, it is important to analyse where the resources are going, how they are being utilized or converted, and what happens to the converted products. This stepwise account of the resource flow and transformation will provide an understanding of the influence or impact on employment and income in forestry.

Specifically, this report is concerned with the direct and indirect impact of sawmills and pulp and paper mills. In addition to employment, and salaries and wages paid, it is important to know what the industries purchase and the geographical origin of their purchases. Likewise, it is important to know the value, degree of processing, and destination of output.

This analysis is limited to sawmills and pulp and paper mills for 1969. Included in the category of sawmills are a number of mills producing boxwood. Included with the pulp and paper mills is a hardboard producer. It was felt that because of the volume of wood used and direct employment, this mill should be included in the analysis but because of restrictions on printing confidential data, this mill was grouped with pulp and paper mills.

Also included in the analysis are the sawmill employees. The importance of sawmills at the community level has been stressed on numerous occasions. Many people feel that sawmills provide the necessary supplementary employment to many fishermen and farmers who otherwise might be forced to move to more populated areas. An attempt is made to determine the period of employment and the proportion of income derived from the mill. Pulp and paper mill workers were not analysed because, for the most part, their employment is permanent and there is no evidence that these people have more than one job. The number of man-hours paid, number of employees, and salaries and wages are available for pulp and paper mill employees, however.

The year 1969 was chosen since this was the latest year for which much of the information would be available; only one year was chosen because of the problem of obtaining reliable data over several consecutive years. In many instances, records were simply not available.

III. PROCEDURE

A. DEFINITION OF SAWMILLS AND PULP AND PAPER MILLS

1. Definition of Sawmills

For this study, sawmills are defined as those mills or establishments which convert roundwood (logs or bolts) into lumber, boxwood, railway ties, mine packs, laths, shingles, staves and headings, and so forth. This corresponds closely with the definition as listed in the Standard Industrial Classification Manual (D.B.S. 1970). It should be pointed out, however, that Statistics Canada defines establishments as "The smallest unit which is a separate operating entity capable of reporting certain specified input and output data." Because a number of smaller mills or firms are not able to provide this information, they are not included. Confusion arises because the number of sawmills as reported within the province by various provincial sources might not be equal to the number of establishments listed by Statistics Canada.

The sawmills in Nova Scotia were considered to be those listed in "Producers and Production of Forest Products - 1969" (N.S. Dep. Lands & Forests 1970). In 1969, there were reported to be 316 firms producing lumber, boxwood, or both. Some firms are reported to own more than one mill (estimated that about 15 firms operated more than one mill, but the exact number of mills is not known). These 316 firms were considered to be the number of identifiable sawmills. Where a firm operated more than one mill, the data were combined.

These 316 mills included 202 which produced lumber only; 29 mills which produced lumber and chips only; 76 mills which produced lumber and another product such as mine packs only (this excludes chips as other products); and 9 mills which produced boxwood only. This study does not include 58 mills which produced only one of the following: railway ties; mine packs; laths; staves and headings; shingles; or more than one product but not lumber. Sawmills are thus defined as those mills which produced lumber only, boxwood only, or lumber in combination with boxwood, staves and headings, shingles, and so forth.

2. Definition of Pulp and Paper Mills

Pulp and paper mills are defined as those establishments which convert bolts (or chips) to fiber or woodpulp. Included are pulp mills as such, combined pulp and paper mills, and paper mills manufacturing

paper and board products. In 1969, there were five pulp and paper mills in Nova Scotia. Because of the volume of wood used, the inputs of other materials and supplies, and the necessity of keeping the data confidential, a hardboard mill was included with the pulp and paper mills.

B. DEFINITION OF IMPACT AND CHOICE OF INDICATORS

1. Definition of Economic Impact

In this study, economic impact is broadly defined as the consequences or effects of sawlog and pulpwood processing on the economic goals of the province. These goals are not well defined, but are presumed to include a high and sustained level of employment and income, reasonable price stability, and equitable distribution of income. Employment and income are of primary concern here.

This concern, however, includes not only the direct effects, that is, the employment, salaries and wages, and so forth, associated with the mills, but also the indirect effects. Because mills buy fuel, wood, chemicals, and so forth, additional employment and income are generated indirectly. The quantity and types of inputs purchased determine the size of these indirect effects. Also, employment and income may be created indirectly from further processing of an industry's output, for example, furniture plants rely on output of sawmills. The extent of employment and income generated depends on the degree of further processing.

Since the concern here is with the impact on the province of Nova Scotia, it was important to distinguish the employment and income generated within the province from that outside. There is little benefit to the province if a major portion of the inputs to an industry (and therefore employment and income associated) are imported from another province or country. Likewise, products or outputs further processed outside Nova Scotia contribute little toward employment and income in the province.

Impact can be defined to include other less identifiable effects. The sawmill industry in Nova Scotia and elsewhere is frequently cited as an example of an industry whose importance or contribution goes beyond its mere size as indicated by the number of persons employed or the amount of salaries and wages paid. It is argued that the industry's real importance

stems from its high local impact or community dependence. The industry is regarded as an important outlet for local investment funds, a market for woodlot products, and a local source of supply for building materials.

On the other hand, it is argued that the industry is characterized by poor working conditions as indicated by a high rate of accidents. It is pointed out that average wages are low and that employment is seasonal. Because of the seasonal nature of employment, it is felt that labor is inhibited from moving to more productive occupations. Many of the smaller mills are criticized for their inefficient use of wood; particularly those mills that do not have chipping equipment.

The pulp and paper industry is cited for its high average wages, favorable working conditions, and year-round employment. The industry is criticized for the low labor input relative to capital requirements and wood use. It has been argued that many of the materials, such as supplies and chemicals, used by the mills are imported. Further to this, air and water pollution are frequently cited as negative effects.

2. Choice of Impact Indicators

Traditionally, a variety of indicators, such as employment, value added, and value of shipments, have been used to describe an industry's importance. The reason for this is apparent from the foregoing discussion. This variety stems from our inability to define welfare, standard of living, or economic and social goals precisely and impact or industry importance is relative to these goals.

For the purposes of this study, the main indicators of concern were inputs and outputs or products. The major inputs were fuel and electricity, materials and supplies (including wood), services, labor, government services, and depreciation. Of special interest was the quantity, value, and characteristics of wood input. Also, of course, there was particular concern, especially in the sawmilling industry, with labor - the number of people employed, duration of employment, alternatives for the employees, and so forth. Interest was shown in sawmill employees because of the seasonal nature of work. In addition, it was important to determine the distribution of wages, for example average hourly earnings and proportion of the total income earned by mill employment.

To distinguish the extent of imported inputs, it was necessary to determine the geographic origin of purchases.

The value of outputs is one of the most commonly used indicators of the importance or impact of an industry. However, this might be a very poor indicator if a large proportion of the inputs for that product are imported. The type, quantity, value, and geographic destination of products was considered to be useful information. The type of product provides a good indication of the degree of processing.

In addition to inputs and outputs, it was considered important to determine capital investment.

C. COLLECTION AND TABULATION OF DATA

Because of the lack of pertinent and up-to-date information on sawmills and pulp and paper mills, it was decided to conduct a survey.¹ Questionnaires (see Appendices) were designed in consultation with the Executive Director and the Field Supervisor of the Nova Scotia Forest Products Association, and members of the Nova Scotia Department of Lands and Forests. Data from the surveys were coded and transferred to standard IBM cards for analysis.

Because of the comprehensive nature of the information required and the difficulty expected in achieving a high response to mailed questionnaires, it was felt that sawmill operators and employees should be interviewed personally. In view of the time constraints, however, and the expected homogeneity by sawmill size class, a sample was considered to be adequate.

The most complete list of sawmills operating in Nova Scotia was considered to be "Producers and Production of Forest Products - 1969" (N.S. Dep. Lands & Forests 1970). This list includes the names of producers, geographic location, size class, and products. The pertinent information on size of sample and response is shown in Fig. 1 and outlined in Table 1.

¹ The Forestry Statistics Section of the Manufacturing and Primary Industries Division of Statistics Canada (formerly Dominion Bureau of Statistics) was consulted before design and formulation of the questionnaires. Although much of the data collected by Statistics Canada were pertinent, much of it was not available except on an industry basis, i.e. for all mills combined. Information for individual mills was necessary to permit comparison by size of mill. Data by mill are not available without the permission of the respective establishments. It was felt that although permission might be obtained to use the data, the time delay would be too great.

Table 1. Sample survey of sawmills in Nova Scotia

Mill size class (M.f.b.m.)	Number of mills	Sample size			
		Proposed		Actual	
		Percent	Number	Percent	Number
>6001	4	100	4	100	4
3001-6000	13	100	13	100	14 ^a
2001-3000	12	100	12	90	11
1501-2000	13	50	6	31	4
1001-1500	22	50	11	50	11
501-1000	25	50	12	40	10
401- 500	10	50	5	50	5
301- 400	9	50	4	22	2
201- 300	21	50	10	33	7
101- 200	34	50	17	35	12
≤ 100	153	33	51	12	18
Total	316	46	145	31	98

a. The survey showed that there were 14 mills in this size class rather than 13 as reported by N.S. Dep. Lands & Forests (1970).

As indicated in Table 1, sawmills were stratified on the basis of production. The classes listed are those reported by the Department of Lands and Forests in the producers survey. After consideration of the time limitations and the precision desired, the sample fractions were determined. As can be seen in Table 1, the proposed size of sample varied from 100% of the total for the class for the larger mills to 33% for the smaller mills.² The proposed number of mills to be sampled was 145. Mills to be surveyed in the classes with less than 100% sample were selected randomly. If the original mill selected to be sampled could not provide the information, or if the owner was not available, an attempt was made to select an alternate.

The actual percentage of mills sampled by size class was lower than that proposed in most cases (Table 1). The actual sample size was 98 mills rather than 145. There are several reasons for this. It was

² Assistance from the Biometrics and Computer Science Branch, Department of the Environment in designing the sample survey is gratefully acknowledged.



Fig. 1. Distribution of sawmills and pulp and paper mills in Nova Scotia, 1969, and sample size.

proposed that 51 mills or 33% of the smallest size class (≤ 100 M.f.b.m.) be sampled; only 18 of these mills were sampled. A further 20 of these mills were visited, but of these, the owner was not available for 7, the production was negligible for 7 (in several cases < 10 M.f.b.m.), 3 mills had closed down, and records were not available for 3 mills. Also, for this size class, it was felt that the information received did not warrant the time required. Several of the mills in this size class operated only 2 or 3 weeks in 1969. Some mills operated only long enough to saw some lumber for personal use. These mills are insignificant as regards the economic impact to the province. This will be discussed further in a later section.

Interviewing was started in August 1970. To test the questionnaires for possible problems and inconsistencies and to make desired alterations, four sawmills representing different size classes were chosen. A letter of introduction was sent to each mill by the Executive Director of the Nova Scotia Forest Products Association. Two interviewers were provided, one each from the Department of Lands and Forests and the Forest Products Association. These persons were chosen because of their personal experience in owning and operating sawmills and because of their familiarity with many of the operators. The province was divided into roughly two sections. The mills in each half were to be contacted by one of the interviewers.

Although it was expected that the interviewing would be completed by December 1970, it was not completed until July 1971, because many mills were closed during the winter months.

As a result of the complex nature of the significance of sawmills at the community level, and the lack of information on the real dependence of employees on the mills, a sample survey was conducted as a supplement to the mill survey. A one-page questionnaire was designed to determine such characteristics of the employees as age, number of dependents, special skills, and proportion of income from the mills (see Appendix 2).

To provide a reliable estimate, it was felt that a sample of about 10% should be obtained. The actual number of employees contacted

was 168. To obtain an unbiased sample, it was felt that the proportion of 10% should be applied by mill size group and by major occupation in the mill. In other words, after it was determined from the mill questionnaire how many employees there were and the distribution by main job, a reasonable indication of the number to sample was known. Although it was intended to sample only mill workers proper, some truck drivers were included.

A questionnaire similar to that for the sawmill industry was designed for the pulp and paper mills (see Appendix 3). These questionnaires were completed by the mills and returned by mail.

IV RESULTS

A. DIRECT IMPACT OF SAWMILLS IN NOVA SCOTIA

1. Basis for Estimates

The procedure for sampling sawmills was outlined in the previous section. It was pointed out that because of the time limitation, all mills could not be interviewed. Because of this, it is important to consider the reliability of the sample estimates.

The most direct means of checking the reliability of the estimates is to look at what might be considered actual lumber production (available from N.S. Dep. Lands & Forests 1970) and the production estimated from the sample. If this estimate can be considered as reliable, it is probably safe to assume that estimates of inputs, outputs, and value are also reliable.³

Table 2. Estimated lumber production for various size classes of sawmills in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Industry survey			Dep. Lands & Forest		
	Number of mills	Production (M.f.b.m.)	Percent of total	Number of mills	Production (M.f.b.m.)	Percent of total
>6001	4	54,740	22.8	4	50,720	22.5
3001-6000	14	57,987	24.1	13	52,175	23.2
2001-3000	12	31,834	13.2	12	30,118	13.4
1001-2000	34	47,638	19.8	35	49,142	21.8
501-1001	25	18,968	7.9	25	18,944	8.4
301- 500	19	8,573	3.6	19	7,779	3.5
101- 300	55	12,213	5.1	55	11,224	5.0
≤ 100	153	8,310	3.5	153	5,010	2.2
Total	316	240,263	100.0 ^a	316	225,112	100.0

a. Figures may not add to 100.0 due to rounding.

Source: Industry survey, 1970; N.S. Dep. Lands & Forests, 1970.

³ It should be pointed out that variances and standard errors have been calculated for all population estimates. For an example of the estimation procedure, see Appendix 4.

The estimated lumber production for various mill size classes is presented in Table 2. The production estimated by the Department of Lands and Forests is also presented for comparison. It will be noticed that the number of size classes has been reduced. This was done because of the small sample size in some classes. All subsequent estimates are based on this stratification.

The total lumber production for 1969 estimated from this survey was about 240 million f.b.m., about 15 million f.b.m. or about 6.7% over that estimated by the Department of Lands and Forests (Table 2). The major discrepancies appear in the two largest size classes which account for 10 million f.b.m. of the difference. This is unusual in that all 18 mills in these two classes were interviewed.⁴ In other words, the figure given should have been the actual production for that year. In terms of percentage of total production by all classes, these two estimates are very close to those reported by the Department of Lands and Forests (Table 2).

With the exception of the size class 1001-2000 M.f.b.m., the estimated lumber production in all classes is over that reported by the Department of Lands and Forests. A rather large discrepancy also appears in the estimated production in the smallest size class (< 100 M.f.b.m.). A possible explanation for this is that the sample was biased toward larger mills in the class because of ease in contacting.

A further possible explanation for differences in estimates of lumber production might be that the volume of custom production⁵ was examined more closely. An attempt was made to separate volume of custom-sawn lumber so that value of inputs could be determined more accurately. Although the sawmill operator might not have included value of custom-sawn logs as input, fuel and electricity, labor, and so forth were used in sawing.

⁴ It will be noticed that the Lands and Forests report shows only 17 mills in the two largest classes. The survey showed that according to production reported there were actually 14 mills (rather than 13) in the size class 3001-600 M.f.b.m.

⁵ Custom-sawn lumber was defined as that sawn specifically for an individual or group, usually from logs supplied to the mill by the individual. There were some mills which theoretically produced only custom lumber. In the latter case, mills were not distinguished from those producing lumber for the general market.

Estimated lumber production by various size classes for softwood, hardwood, and custom lumber is shown in Table 3. While the volumes of softwood or hardwood custom-sawn lumber were not separated, it probably is reasonable to assume that the majority was softwood. These figures show that of the estimated 231.9 million f.b.m. produced for the general market, about 224.7 or 97% was softwood. If the custom-sawn lumber is assumed to be softwood, slightly over 97% of the total volume is softwood.

Table 3. Estimated production of softwood, hardwood, and custom-sawn lumber by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number of mills	Estimated lumber production (M.f.b.m.)			
		Softwood	Hardwood	Custom	Total
>6001	4	54,080	660	0	54,740
3001-6000	14	53,960	1,653	2,374	57,987
2001-3000	12	31,510	120	204	31,834
1001-2000	34	42,398	2,098	3,142	47,638
501-1000	25	16,230	1,775	963	18,968
301- 500	19	8,430	111	32	8,573
101- 300	55	11,310	191	712	12,213
≤ 100	153	6,804	572	934	8,310
Total	316	224,722	7,180	8,361	240,263

Source: Industry survey, 1970.

2. Capital Investment in the Sawmill Industry

It is difficult to determine the capital investment in any industry, particularly if the industry is made up of a large number of firms which may vary considerably in type of equipment and years in use. There is the problem of defining what is meant by capital investment. It may be replacement value of equipment, buildings, and so forth; depreciated value; insured value; or initial expenditures plus repair and maintenance.

For purposes of this study, capital investment in sawmills was defined as current market value. This, of course, is based on the assumption that the equipment, buildings, land, etc., could be sold.

It was felt that this was the most meaningful indicator of current capital input because the market value could be arrived at on a reasonably consistent basis. And, the important concern here was the comparison among mill size classes of output, employment, and so forth by capital investment. The estimates are considered to be reasonably accurate because of the extensive experience of the interviewers.

An attempt was made to identify capital investment by component, that is, the value of building, equipment, land, and so forth. It was not possible in some cases to separate investment in the mill from that in logging or farming operations, particularly regarding tractors, forklifts, and so on.

The estimated total capital investment in the sawmill industry in 1969 was about \$9.9 million (Table 4). Of this about \$5.0 million was in machinery and equipment, \$2.4 million in motor vehicles, \$1.8 million in buildings, and the remainder in land. The value invested per mill shows the expected decrease with decreasing size class.

The capital investment in equipment for sawmills in Nova Scotia in 1965 has been estimated at about \$5 million (A.D.B. 1968). Whether this figure includes buildings, land, and motor vehicles is not known. Also, it is not stated whether capital value is depreciated value, book value, or insured value.

The A.D.B. report lists the capital value of the mills with production greater than 6,000 M.f.b.m. at \$1.2 million. The estimated capital value of the mills producing from 3000-6000 M.f.b.m. is \$1.2 million, and for mills from 2000-3000 M.f.b.m. is \$1.1 million. Thus the A.D.B. study estimates the total capital value for the 31 mills (1965) producing over 2,000 M.f.b.m. at \$3.5 million.

Estimates of this study (Table 4) show that investment or market value for the 30 mills (1969) producing more than 2,000 M.f.b.m. was about \$5.3 million. The discrepancy in estimated capital value appears in the size class 3001-6000 M.f.b.m.

3. Inputs of the Sawmill Industry

In a previous section, impact was defined as the effects or consequences of sawlog or pulpwood processing. The effects on employment and income are of primary concern. Direct effects are relatively straightforward; these are simply the employment in the mills and the

Table 4. Estimated capital investment by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number of mills	Sample size	Average production per mill (M.f.b.m.)	Capital investment ^a			
				Buildings	Machinery & equipment	Land ^b	Motor vehicles
>6001	4	4	13,685	250.8	880.1	66.8	234.0
3001-6000	14	14	4,142	458.0	1,241.0	90.1	685.0
2001-3000	12	11	2,653	181.3	788.2	58.2	350.6
1001-2000	34	15	1,401	289.3	864.6	77.2	515.4
501-1000	25	10	759	96.3	343.8	23.3	140.0
301- 500	19	7	451	80.8	171.0	41.5	71.3
101- 300	55	19	222	254.4	414.8	206.3	227.3
< 100	153	18	54	196.3	367.2	55.6	160.1
Total	316	98	760	1,807.2	5,070.7	629.0	2,383.7
							9,890.6
							31.3

a. Values in \$'000.

51.3%

24.1%

b. Includes mills site only, not forest land owned by the mills.

Source: Industry survey, 1970.

salaries and wages paid. It was pointed out, however, that an industry generates employment and income indirectly as a result of purchases of wood, fuel and electricity, and so forth. The indirect effect on employment and wages depends upon the number of people employed in these other sectors and their earnings.

The concern here is with impact on Nova Scotia and it is therefore important to distinguish the geographic origin of inputs. It is of little consequence in terms of benefit to the economy of Nova Scotia if employment and income are being generated in Ontario or Quebec as a result of purchases of saw bits or files by sawmills in Nova Scotia.

It is likewise important to distinguish the effect of processing and geographic destination of sawmill output. Lumber that is planed, kiln-dried, and used in the production of furniture or boats in Nova Scotia has a larger impact on employment and wages in Nova Scotia than does lumber which is exported rough and green or only partially air-dried.

The variation in impact by mill size or type is of particular interest. Larger mills generally operate for a longer period of the year than smaller mills. Also, it is important to determine if mills of approximately equal production use different amounts of fuel and electricity, or pay less per unit for wood.

Inputs of the sawmill industry were separated into a number of categories. These include fuel and electricity, operating materials and supplies (which includes sawbits, steel strapping, office supplies, etc.), wood, business expenses and services (which includes insurance, rental for buildings and railway sidings, telephone, interest, association dues, etc.), salaries and wages, income taxes, and so on (Table 5A). These inputs do not include profit or depreciation of equipment, which could not be determined.

The major categories of expenditure presented here are not further defined. Two sub-totals are presented in Table 5; the first is composed of the material inputs, and the second is roughly equivalent to what is commonly referred to as "value added". Wood and labor accounted for about \$21.2 million (Table 5A) or about 82% of the total value of inputs of sawmills in Nova Scotia in 1969. Of the remaining \$5 million of input, fuel and electricity, materials and supplies (excluding wood), and business expenses and services accounted for about \$1 million each.

Table 5. Importance of inputs for sawmills in Nova Scotia by mill size class, 1969

A. Inputs in dollar values (\$'000)

Mill size class (M.f.b.m.)	No. of mills	Total fuel, electricity and materials		Total added value		Overall total \$'000
		\$'000	%	\$'000	%	
<6001	4	3,694.1	65.8	1,920.2	34.1	5,614.3
3001-6000	14	3,535.8	57.9	2,580.2	42.2	6,116.0
2001-3000	12	2,031.6	58.3	1,453.3	41.6	3,484.9
1001-2000	34	2,840.1	58.6	2,009.5	41.4	4,849.6
501-1000	25	1,238.1	66.8	614.4	33.2	1,852.5
301- 500	19	602.1	58.6	424.9	41.4	1,027.0
101- 300	55	754.4	46.7	861.6	53.4	1,616.0
< 100	153	540.4	43.6	696.0	56.2	1,236.4
Total	316	15,236.6	59.1	10,560.1	40.9	25,796.7

Mill size class (M.f.b.m.)	Fuel and electric power	Materials and supplies	Wood
>6001	109.1	184.0	3401.0
3001-6000	309.6	188.2	3038.0
2001-3000	179.6	140.0	1712.0
1001-2000	199.6	214.5	2426.0
501-1000	78.3	75.8	1084.0
301- 500	71.3	98.8	432.0
101- 300	79.3	76.1	599.0
< 100	70.9	68.5	401.0
Total	1097.7	1045.9	13093.0

Mill size class (M.f.b.m.)	Business expenses and services	Salaries and wages	Income taxes	Local and municipal taxes	Work- mens' compen- sation	Vehicle regis- tration
>6001	281.4	1417.0	134.0	22.0	52.1	13.7
3001-6000	345.4	1994.0	111.3	36.6	71.0	21.9
2001-3000	249.0	1043.0	74.0	28.0	43.1	16.2
1001-2000	194.8	1582.7	108.1	30.4	51.7	41.8
501-1000	36.8	484.0	31.8	4.8	19.8	37.2
301-500	58.6	330.6	1.5	13.3	11.1	9.8
101-300	68.8	692.7	43.4	18.2	22.3	16.2
<100	52.3	587.5	8.5	18.7	13.7	15.3
Total	1287.1	8131.5	512.6	172.0	284.8	172.1

Table 5B. Inputs as percentages^a of the class totals

Mill size class (M.f.b.m.)	Fuel and electric power	Materials and supplies	Wood	Business expenses and services	Salaries and wages	Income taxes	Local and municipal taxes	Workmens' compen- sation	Vehicle regis- tration
>6001	1.9	3.3	60.6	5.0	25.2	2.4	0.4	0.9	0.2
3001-6000	5.1	3.1	49.7	5.6	32.6	1.8	.6	1.2	.4
2001-3000	5.2	4.0	49.1	7.1	29.9	2.1	.8	1.2	.5
1001-2000	4.1	4.4	50.0	4.0	32.6	2.2	.6	1.1	.9
501-1000	4.2	4.1	58.5	2.0	26.1	1.7	.3	1.1	2.0
301- 500	6.9	9.6	42.1	5.7	32.2	.1	1.3	1.1	1.0
101- 300	4.9	4.7	37.1	4.3	42.9	2.7	1.1	1.4	1.0
≤ 100	5.7	5.5	32.4	4.2	47.5	.7	1.5	1.1	1.2
Total	4.3	4.1	50.7	5.0	31.5	2.0	.7	1.1	.7

a. May not add to 100.0 due to rounding.

Source: Industry survey, 1970.

Income taxes paid were estimated at about \$0.5 million, and local and municipal taxes at about \$0.2 million. Payments for workmens' compensation were about \$0.3 million and vehicle registration was about \$0.2 million.

The cost of fuel and electricity, materials and supplies, and wood for the industry therefore was about \$15.2 million or 60% of total inputs while the remaining inputs or value added made up slightly over 40% of the total (Table 5B).

The value of expenditures for inputs from outside Nova Scotia in 1969 was quite small, and probably amounted to less than \$1 million or less than 4% of the total value of inputs by the industry. The only major inputs which originated or were purchased from outside the province were in the category of materials and supplies. These inputs include saw-bits, belting, wire products such as steel strapping, office supplies, and so forth. Although most of these inputs were produced outside the province, many were probably distributed through outlets within the province.

In terms of total value of inputs, the 14 mills in the class 3001-6000 M.f.b.m. accounted for the largest value, about \$6.1 million (Table 5). In terms of average value of input per mill, however, each mill in the largest size class (\geq 6001 M.f.b.m.) had an average input of about \$1.4 million, while that for the class 2001-6000 M.f.b.m. was only about \$0.4 million.

The comparison of the proportion of total lumber production by sawmill size class (Table 2), with the proportion of the total value of inputs by size class (Table 5), shows, as might be expected, a very high correlation. For example, the mills in the size class \geq 6001 M.f.b.m. produced about 22.8% of the total volume of lumber for the industry. The value of inputs as a proportion of the total value for the industry was 21.8%. Similarly, the size class 3001-6000 M.f.b.m. accounted for about 24.0% of production and about 23.7% of the total inputs.

In Table 5A, the total value of inputs by major category for the various sawmill size classes was presented. To compare average costs per unit of production, the total value of expenditures by size class was divided by the volume of production. The costs per M.f.b.m. for the size class are presented in Table 6.

Table 6. Value of inputs per M.f.b.m. of production in Nova Scotia by mill size class, 1969

Mill size class (M.f.b.m.)	No. of mills	Lumber production of the class (M.f.b.m.)	Total fuel and material inputs	Total value added \$	Overall total
>6001	4	54740	67.48	35.08	102.56
3001-6000	14	57987	60.97	44.50	105.47
2001-3000	12	31834	63.82	45.64	109.46
1001-2000	34	47638	59.62	42.18	101.80
501-1000	25	18968	65.27	32.39	97.66
301- 500	19	8573	70.23	49.54	119.77
101- 300	55	12213	61.77	70.55	132.32
< 100	153	8310	65.03	83.75	148.78
Total	316	240263	63.34	43.95	107.37

Fuel and material inputs (\$)

Mill size class (M.f.b.m.)	Fuel and electricity	Materials and supplies	Wood
>6001	1.99	3.36	62.13
3001-6000	5.33	3.25	52.39
2001-3000	5.64	4.40	53.78
1001-2000	4.18	4.50	50.92
501-1000	4.13	4.00	57.14
301- 500	8.32	11.52	50.39
101- 300	6.49	6.23	49.05
< 100	8.53	8.24	48.26
Total	4.57	4.35	54.49

Value added (\$)

Mill size class (M.f.b.m.)	Business expenses and services	Salaries and wages	Income taxes	Local and municipal taxes	Workmans' compensation	Vehicle registration
>6001	5.14	25.89	2.45	0.40	0.95	0.25
3001-6000	5.96	34.39	1.92	.63	1.22	.38
2001-3000	7.82	32.76	2.32	.88	1.35	.51
1001-2000	4.08	33.22	2.26	.63	1.08	.87
501-1000	1.94	25.52	1.68	.25	1.04	1.96
301- 500	6.83	38.56	.17	1.55	1.29	1.14
101- 300	5.63	56.72	3.55	1.49	1.83	1.33
< 100	6.29	70.70	1.02	2.25	1.65	1.84
Total	5.36	33.84	2.13	.72	1.19	.72

These values were not calculated to determine the profitability of lumber production as such but a general indication of profitability might be ascertained. The significance of the differences in average values by inputs and mill size class is not known. Although an attempt has been made here to identify average values, the main purpose of the data was to determine total value of inputs by mill size class.

The identification and comparison of these input values must be made with several considerations in mind. Most important, one must ask whether the data are sufficiently reliable to permit a meaningful comparison. It is well known that the care and procedures for accounting various costs differ among mills. Some of the figures given in the questionnaires were simply guesses, and it is quite probable that some of the discrepancy in average costs for the size classes results from this. In order to ensure somewhat reliable information, one would have to set up identical accounting procedures for all mills. Nevertheless, average values of inputs are presented here by mill size class, and the overall average input of \$100 to \$110 per M.f.b.m. (Table 6) is probably reasonable.

The mills in the three smallest size classes (301-500, 101-300, and ≤ 100 M.f.b.m.) exhibit a relatively high total value of input per M.f.b.m. and salaries and wages were particularly high. This might be due to inefficiency which in turn might be due to depreciated capital equipment, frequent shutdown, and so forth. However, there appears to be a more acceptable reason. The sample size in each class was 5, 15, and 17 respectively for the classes 301-500, 101-300, and ≤ 100 M.f.b.m. In these three classes combined, seven boxwood mills were sampled. Because of further processing or integrated operations in most of these mills, the labor input and consequently the salaries and wages paid tended to be higher than for mills producing lumber only.

The average value of the various inputs for all mills combined was \$107.21 per M.f.b.m. This will be compared later with the value of output, and with data for the pulp and paper industry. Employment and wood inputs are discussed further in the next sections.

Estimated lumber production for the industry was summarized in Table 3. To estimate volume and value of inputs, the volume of wood used by sawmills was calculated on the basis of lumber scale, rather than log scale. A mill producing 2 million f.b.m. of lumber was assumed to have

Table 7. Quantity and value of wood used (lumber scale) by mill size class in Nova Scotia, 1969^a

Mill size class (M.f.b.m.)	Softwood			Hardwood			Custom			Total		
	Volume	Total value	Mean value	Volume	Total value	Mean value	Volume	Total value	Mean value ^b	Volume	Total value	Mean value
>6001	54080	3361	62	660	40	60	0	0	-	54740	3401	62
3001-6000	53960	2829	52	1653	86	52	2374	123	52	57987	3038	52
2001-3000	31510	1695	54	120	6	50	204	11	54	31834	1712	54
1001-2000	42398	2159	51	2098	107	51	3142	160	51	47638	2426	51
501-1000	16230	916	56	1775	114	64	963	54	56	18968	1084	57
301- 500	8430	425	50	111	5	45	32	2	50	8573	432	50
101- 300	11310	554	49	191	10	53	712	35	49	12213	599	49
< 100	6804	329	48	572	27	48	934	45	48	8310	401	48
Total	224722	12268	55	7180	395	55	8361	430	51	240263	13093	54

a. Volumes in M.f.b.m.; Total values in \$'000's; Mean values in \$ per M.f.b.m.

b. Majority of wood sawn is assumed to be softwood, therefore the average value for softwood was used.

Source: Industry survey, 1970.

used 2 million f.b.m. of wood. Therefore, the volume of lumber produced reflects the volume of wood input.⁶ The value was also based on this assumption.

The estimated quantity and cost of wood used by sawmill size class and for the industry are shown in Table 7. As indicated in previous tables, the volume of wood used was about 240 million f.b.m. (lumber scale). The total cost or value was estimated at about \$13.1 million or an average of \$54 per M.f.b.m. The average cost by size class indicates that for softwood used, the largest class (≥ 6001 M.f.b.m.) reported the highest value and the smallest size class (≤ 100 M.f.b.m.) reported the lowest value (Table 7).⁷ The cost of hardwood was about the same as for softwood, with an average for all classes of \$55 per M.f.b.m.

To determine the dependence of other sectors, namely logging, on sawmills, each of the mills was asked what percentage of their input they logged on their own, was contracted out, and was purchased. Although there were differences among mill size classes, they were not too substantial (Table 8).

In addition to the question of responsibility for logging, an attempt was made to identify the source of logs by landowner group. Results show that by size class, mills relied on their own land for between 22 and 67% of their logs (Table 9). Only a small proportion of the logs used in 1969 were reported to have come from Crown stumpage, that is, directly from Crown land through a cutting license or lease and none came from Crown land leased to a pulp company. For all size classes, there was a high dependence on small freehold land (<1000 acres) for sawlogs.

The average hauling distance for logs reported by the mills in the sample was 15 miles, and the range was from 1-60 miles. As might be expected, the larger mills had longer average hauling distances (Table 10).

⁶The Nova Scotia Department of Lands and Forests uses the following conversion factors: 1000 f.b.m. lumber = 83 ft³ and also = 176 ft³ volume of roundwood solid wood. Also, 1000 f.b.m. (log scale) = 200 ft³ of roundwood solid wood.

⁷Part of the difference in average cost of wood must be attributed to method of accounting, particularly the charge against stumpage. It is felt that many of the smaller mills which did some of their own logging on their own land, probably attributed less value to stumpage than the larger mills. The average of \$55 probably is a good indication of the real cost.

Table 8. Responsibility for logging for the sample mills by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number sampled	Responsibility for logging ^a		
		Own (%)	Contract (%)	Purchase (%)
>6001	4	53	14	34
3001-6000	13	31	32	37
2001-3000	11	50	26	24
1001-2000	15	55	6	39
501-1000	9	41	3	56
301- 500	6	83	0	17
101- 300	17	53	9	38
≤ 100	16	59	5	36
Total	91	-	-	-

a. Percentages are averages based on what was reported by mills in the respective classes.

Source: Industry survey, 1970.

Table 9. Percentage of logs used from different sources by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number sampled	Mill's freehold	Crown stumpage	Pulp Co. freehold	Other large freehold	Small freehold
>6000 ^a	-	-	-	-	-	-
3001-6000	14	33	13	22	0	32
2001-3000	11	22	8	30	5	35
1001-2000	15	32	6	2	1	59
501-1000	10	45	9	1	0	46
301- 500	6	67	0	8	0	25
101- 300	18	36	1	6	0	57
≤ 100	18	36	0	6	6	52
Total	92	-	-	-	-	-

a. Some of these mills are integrated with pulp and paper companies, and therefore this information is not too meaningful.

Source: Industry survey, 1970.

Table 10. Average hauling distances and ranges for the sample mills by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number sampled	Hauling distance ^a (miles)	
		Average	Range
>6001	4	37	25 - 60
3001-6000	14	22	8 - 45
2001-3000	11	20	7 - 40
1001-2000	15	19	10 - 40
501-1000	10	15	1 - 30
301- 500	6	10	7 - 15
101- 300	18	7	1 - 20
≤ 100	19	7	1 - 30
Total	97	15	1 - 60

a. One way.

Source: Industry survey, 1970.

Table 11. Forest land owned and proportion with harvestable sawlogs for the sample mills by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number sampled	Area of forest land owned (acres)		Percent with harvestable logs	Area with harvestable logs (acres)	
		Total	Average		Total	Average
>6001 ^a	-	-	-	-	-	-
3001-6000	11	58900	5355	46	26800	2436
2001-3000	10	36200	3620	53	19100	1910
1001-2000	14	23800	1700	42	10100	721
501-1000	9	38600	4289	29	11200	1244
301- 500	6	8500	1417	34	2900	483
101- 300	19	19700	1037	42	8300	437
≤ 100	18	5400	300	52	2800	156
Total	87	191100	2197	42	81200	933

a. See footnote Table 9.

Source: Industry survey, 1970.

Table 12. Costs^a of harvesting and hauling of sawlogs for the sample mills by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Felling, bucking, skidding			Loading, hauling, unloading		
	Number sampled	Cost		Number sampled	Cost	
		Average	Range		Average	Range
>6001	4	24	20-30	4	16	14-18
3001-6000	12	21	15-25	11	12	8-20
2001-3000	8	22	20-25	9	13	8-20
1001-2000	12	20	16-25	12	12	10-15
501-1000	7	23	12-30	6	13	10-20
301- 500	5	20	18-23	5	12	10-15
101- 300	13	19	12-30	14	9	4-13
≤ 100	13	20	15-25	12	10	5-12
Total	74	21	12-30	73	12	4-20

a. Costs in \$ per M.f.b.m.

Source: Industry survey, 1970.

The estimated total employment in 1969 for the industry ranged from a low of 1,577 persons in December to a high of 2,892 persons in June. Total employment remained about the same for the four summer months (May - August). The total man-months for the industry was estimated at 27,144 and average monthly employment was estimated to be 2,261. Although not calculated on the same time basis, this would appear to be somewhat higher than that estimated in another report (D.B.S. 1969b) which was 1,817 employees on a yearly basis.

Average number of persons employed by sawmill size class for the year varied from 98 in the class 301-500 M.f.b.m., to 460 for the class 3001-6000 M.f.b.m. Average employment per mill ranged from a high of 71 persons in the largest mills to 2 persons in the smallest mills (≤ 100 M.f.b.m.).

In Table 5, it was reported that the industry paid out an estimated \$8,131.5 thousand in salaries and wages in 1969. If the figure for salaries and wages by sawmill size class is divided by average employment for the class, an estimate of average salary per person employed can

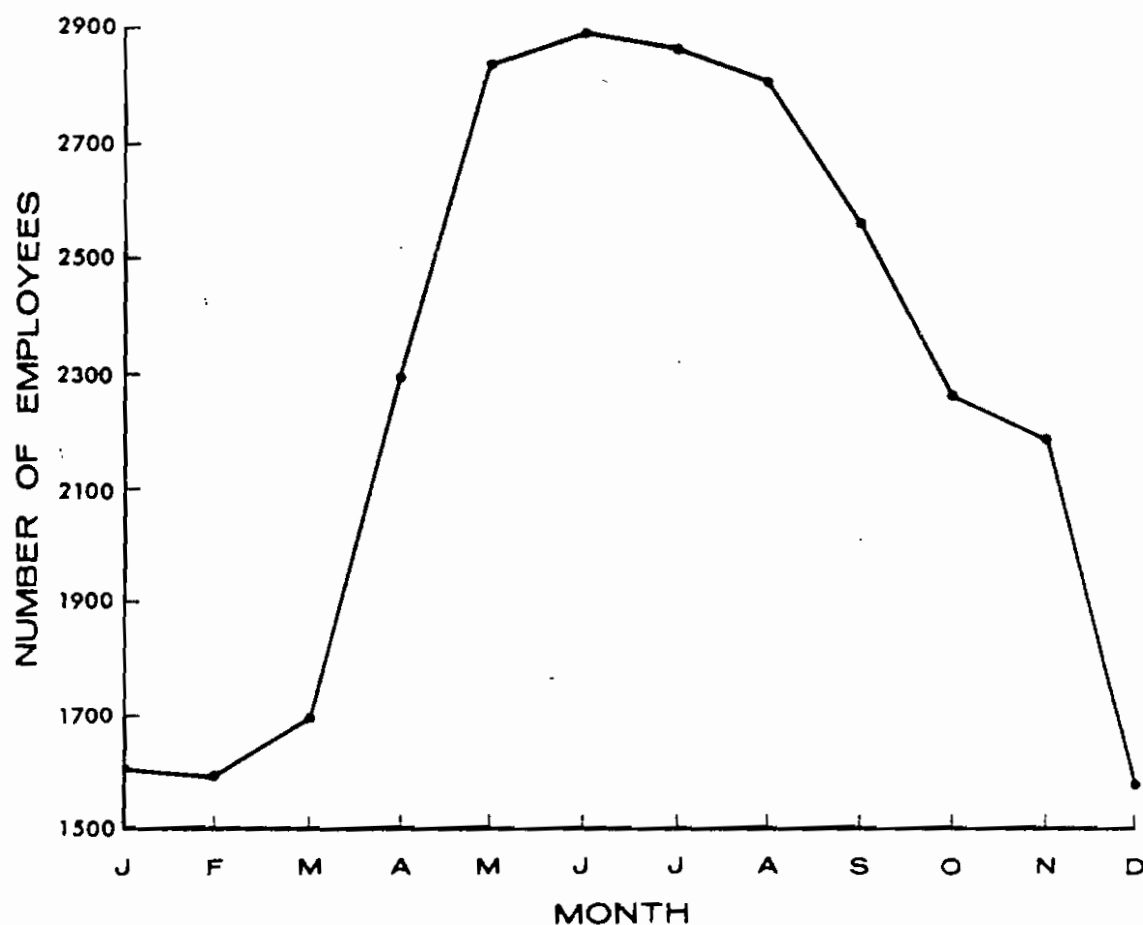


Fig. 2. Monthly employment in the sawmill industry in Nova Scotia, 1969.

be determined (Table 14). These average figures for annual salaries and wages are felt to be reasonably indicative of the relationship among mill size groups, but would not be too meaningful for comparison with other industries, unless data calculated on a similar basis were available.

Table 13. Monthly employment by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	No. of mills	Number of persons employed												Total man months	Mean monthly employ.	Mean mill/ month
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.			
>6001	4	282	283	245	282	289	288	279	287	290	286	287	290	3388	282	71
3001-6000	14	420	426	406	450	471	506	513	510	495	487	472	358	5514	460	33
2001-3000	12	160	124	171	285	302	319	321	326	327	313	272	204	3124	260	22
1001-2000	34	255	255	255	384	629	632	595	602	622	493	459	296	5477	456	13
501-1000	25	106	103	128	133	267	203	253	192	172	197	206	106	2066	172	7
301-500	19	35	48	108	143	149	133	127	168	76	63	105	25	1180	98	5
101-300	55	206	203	211	359	402	400	365	379	252	266	243	226	3512	293	5
< 100	153	153	153	169	250	322	411	403	338	322	153	137	72	2883	240	2
Total	316	1617	1595	1693	2286	2831	2892	2856	2802	2556	2258	2181	1577	27144	2261	7

Source: Industry survey, 1970.

Table 14. Average annual salaries and wages paid per person by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Average number employed ^a	Salaries and wages paid	
		Total (\$'000)	Average annual (\$)
>6001	282	1,417.0	5,025
3001-6000	460	1,994.0	4,335
2001-3000	260	1,043.0	4,012
1001-2000	456	1,582.7	3,471
501-1000	172	484.0	2,814
301- 500	98	330.6	3,373
101- 300	293	692.7	2,364
≤ 100	240	587.5	2,448
Total	2,261	8,131.5	3,596

a. For estimate see Table 13, p. 30.

Source: Industry survey, 1970.

It was originally intended to determine wages both by occupation and mill size class, however, due to the different methods of payment (e.g. hourly, weekly, monthly) and the fact that many employees worked at more than one job, the number of observations was quite low in some size classes. Therefore, average hourly earnings are presented only for selected occupations (Table 15). It is immediately evident that in view of the skills necessary in these occupations, and the years of experience of many of the employees that the average hourly wages are quite low.⁹ One factor bearing on this is that the sawmill employees in 1969 in Nova Scotia were not unionized. (At the time of interviewing, September 1970, one mill reported that employees were in the process of establishing a collective bargaining unit.)

⁹ The minimum wage set by legislation in Nova Scotia as of August 1969 was \$1.25 per hour within the larger metropolitan areas and \$1.15 per hour in the outlying areas.

Table 15. Hourly earnings for selected occupations in the sawmill industry in Nova Scotia, 1969

Occupation	Number sampled	Hourly earnings (\$)		
		Low	High	Average
Sawyer	61	1.25	3.00	2.11
Filer	18	1.50	2.40	2.04
Grader	25	1.35	2.28	1.78
Edgerman	58	1.25	2.22	1.71
Canterman	18	1.00	2.10	1.47
Heavy equipt. operator	13	1.00	2.06	1.41
Green chain worker	57	1.00	1.80	1.37

Source: Industry survey, 1970.

Another factor which obviously must be considered in the analysis of wage rates within an industry is the ability of the industry to pay higher wages. It was indicated earlier (see Table 5B), that salaries and wages together were estimated to account for an average of 31.5% of the value of inputs in the sawmill industry. It seems clear that in order to increase wage rates, either higher average values must be received for the products or increased productivity must be achieved. The importance here, however, is to present the situation as it exists within the industry. These conditions can be compared with those in other sectors. All mills surveyed were questioned as to the length of stay of employees and the percentage from the nearest town. It was felt that this information might provide additional information on the role of the mill at the local or community level.

The lengths of stay of employees were stratified into three categories and the distribution of employees was: < 1 year, 19.8%; from 1-5 years, 30.2%; and > 5 years 49.9%. Although there are no comparable data for other industries, these figures indicate a reasonable degree of employment stability.

All mills combined reported that an average of about 87% of the employees were from the nearest town.

Sawmilling, together with other resource-oriented industries or sectors such as fishing and agriculture, are often looked upon as primary or basic to local economies. It is felt that the importance of these sectors cannot be measured simply by the numbers of people directly employed, but that one must consider social and economic characteristics such as age of employees, skills, alternative occupations, and so forth.

It is well known that many sawmills, particularly smaller mills, do not operate throughout the entire year. Because of the seasonality of the industry, it is particularly important to determine what proportion of income the mills provide, how long people work, and what the alternatives are. It has been argued that many sawmills provide the necessary supplementary employment to many fishermen and farmers who otherwise might be forced to move to more populated areas. It is also argued that the seasonal employment provided by many of the smaller mills serves to inhibit mobility of labor to more stable, higher income employment.

The purpose of the sawmill employee survey (see Appendix 2 for a copy of the questionnaire), as explained earlier, was to find out the characteristics of employees, their dependence on the mills in terms of income, and as far as possible the alternatives open to these people - in other words, the real dependence on the mills.

Based on the estimated employment in the industry in 1969, the proposed sample size was about 150-200 (10%). Since the employee survey was carried out in conjunction with the sawmill survey, the number of employees in the mill was determined and the sample size was based accordingly. So that a representative sample was obtained, an attempt was made to maintain the sample proportion of 10% by occupation within the mill and by mill size class. In other words, if edgermen accounted for 20% of the employees within a mill or mill size class, about 20% of the sample respondents should be from that occupation.

The total number of employees contacted was 168, 7.4% of the estimated total number of employees. The percentage varied with mill size class between 5.7% (26 employees) for the mills producing 1001-2000 M.f.b.m. to 8.7% (15 employees) for the 501-1000 size class. The largest number surveyed was 33 (7.2%) in the 3001-6000 class (Table 16).

Table 16. Number of sawmill employees and sample size by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Estimated number of employees in the class ^a	Number sampled
>6001	282	24
3001-6000	460	33
2001-3000	260	21
1001-2000	456	26
501-1000	172	15
301- 500	98	8
101- 300	293	21
≤ 100	240	20
Total	2261	168

a. Number of employees is the average number for the year for the class. It is the sum of the monthly totals divided by 12. The estimated number was obtained through the industry survey, 1970 (See Table 13).

The occupations of the employees sampled are shown in Table 17. As is evident, there was a reasonably high number of sawyers contacted. Part of the reason for this is that in many of the smaller mills, the sawyer was the only employee and in most of these cases, he was also the owner-manager. The percentage sampled in this occupation group was probably slightly higher than 10%. Several people had more than one job, in which case, the occupation listed was the main one. Some of the occupations listed obviously overlap or are similar.

Although truck drivers are not mill workers as such, a few of these employees also worked part of the time in the mill and therefore were interviewed. Only two of the sample were females. Whether this is indicative of the proportion of male to female workers throughout the industry is not known. Statistics Canada, however, reports for sawmills in 1968, 31 female workers and 1720 male or about 1 female per 55 males.

Table 17. Number of employees in the sample by occupation

Occupation or main job	Number interviewed	Occupation or main job	Number interviewed
Manager/supervisor	28	Grader	3
Office worker	9	Deal carrier	1
Sawyer	42	Piler	4
Edgerman	10	Sorter	4
Tailsawyer	4	Green chain worker	1
Tailedger	1	Labourer	5
Resaw operator	3	Forklift operator	8
Cutoffsaw operator	5	Scaler	1
Slab saw operator	1	Live deck worker	3
Tallyman	5	Truck driver	13
Debarker operator	4	Canterman	3
Planer operator	3	Other	7
		Total	168

The survey of sawmill employees reveals that the workers are characterized by a relatively high average age; that the mean number of years spent in mill work is quite high; and that only a few of these people have alternative occupations outside this area.

The survey also reveals that for each of the 3 years 1967-1969, the employees averaged about 8 to 9 months work and relied on the mills for about 80% of their income. A summary of the information from the survey is outlined below:

mean employee age (years)	48
mean number of --	
dependents	2
years of school	8
years in a mill	13
months employed - 1969	9
months employed - 1968	9
months employed - 1967	8
mean percentage of income from mill - 1969	79
mean travelling distance to work (miles)	6
number of employees who reported --	
no alternate work	24
same kind of work as alternate	54

similar kind of work as alternate	36
different kind of work as alternate	24
this question not applicable.	16
no information.	14

Average monthly employment and percent of income are summarized by mill size class in Table 18. These data show that only those mills producing more than 2000 M.f.b.m. annually can be considered as providing year-round employment. This is substantiated by the high average percentage of income provided by the mills.

Table 18. Summary of average monthly employment and percent of income for employees by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Number sampled	Mean months employed, 1969	Mean percent of income from mill
>6001	24	11.2	97.8
3001-6000	33	11.3	90.4
2001-3000	21	11.0	96.7
1001-2000	26	9.0	84.4
501-1000	15	8.6	67.7
301- 500	8	7.0	60.4
101- 300	21	8.3	68.1
≤ 100	20	4.8	42.0
Total	168	9.3	79.1

Source: Sawmill employee survey, 1970.

The employee survey data show that mills producing between 100 and 2,000 M.f.b.m. provide work for about two-thirds to three-quarters of the year and contribute about the same proportion to total incomes of the employees.

These data further indicate that mills producing less than 100 M.f.b.m. provide for only about 5 months employment on the average per employee and about 40% of the employee's income.

Several other conclusions can be drawn from information received through the employee survey. Because of the high average age, the time spent in mill work, and the limited alternate jobs of a different nature,

these people depend heavily on the mills. Because of the same factors, it is probably safe to assume that mills operating on a seasonal basis are not inhibiting these people from moving to what might be considered as higher paying more productive occupations. The majority of these employees would probably only accept similar work, and only if it were available locally.

The employee survey indicates that there are few young people going into sawmill work. The few that are, are either working as book-keeper/accountants or as general laborers who have little intention of remaining at that job for any duration.

4. Quantity and Value of Output of the Sawmill Industry

In 1969, the sawmill industry in Nova Scotia produced an estimated value of output of about \$24.2 million.¹⁰ This included lumber valued at \$21.1 million; chips, \$2.3 million; slabwood, \$0.2 million; and other products, such as laths, shingles, mine packs, railway ties, and box shocks, at \$0.6 million (Table 19).

For the industry as a whole, lumber accounted for almost 87% of the total value of output while chips amounted to about 9.4%. Other products such as box shocks and railway ties made up about 2.7% and slabwood about 0.6%.

As might be expected, lumber constituted the largest percentage by value of the total output, accounting for at least 80% in all mill size classes. In the larger mills (> 1001 M.f.b.m.), "other products" accounted for less than 2% of the total value. In the smaller mills (< 300 M.f.b.m.), however, this value was about 17%. This is due largely to the value of box shocks and boxes. Slabwood averaged 1 to 2% of the total value of output for most classes. Further detail regarding lumber and chip production is presented in the following two sections.

Estimated lumber production, as indicated in the section on input, was about 240.3 million f.b.m. This is estimated to be the amount produced and sold. Inventory is assumed to have remained unchanged. The estimated total lumber sales from figures reported was about 258.8 million

¹⁰ If delivered value were used rather than value f.o.b. sawmill for lumber and chips, the total value would be about \$26.5 million.

Table 19. Estimated value (\$'000) of output and percentage of total by product and mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	No. of mills	Lumber		Chips		Slabwood		Other ^a		Total		Average output per mill (\$'000)
		Value	Percent ^b	Value	Percent ^c	Value	Percent	Value	Percent	Value	Percent ^d	
>6001	4	4972.8	85.2	864.6	14.8	0.0	0.0	0.0	0.0	5837.4	100.0	1459.4
3001-6000	14	4862.6	86.3	678.2	12.0	7.0	.1	98.8	1.6	5636.6	100.0	402.6
2001-3000	12	2926.1	85.8	484.1	14.2	.2	^e	.0	.0	3410.4	100.0	284.2
1001-2000	34	4028.8	92.8	251.4	5.8	58.1	1.3	3.4	.1	4341.7	100.0	127.7
501-1000	25	1601.0	93.3	.0	.0	37.5	2.2	77.5	4.5	1716.0	100.0	68.6
301-500	19	626.0	92.1	.0	.0	8.0	1.2	45.6	6.7	679.6	100.0	35.8
101-300	55	1292.4	91.0	.0	.0	27.5	1.7	276.0	17.3	1595.9	100.0	29.0
≤ 100	153	804.6	82.3	.0	.0	15.3	1.6	158.3	16.2	978.2	100.0	6.4
Total	316	21114.3	87.3	2278.3	9.4	153.6	.6	649.6	2.7	24195.8	100.0	76.6

a. Includes laths, box shooks and boxes, mine timbers, railway ties, etc.

b. Value of lumber is computed from average value f.o.b. mill, reported by mills in the sample.

c. Value of chips at sawmill.

d. May not add to 100.0 due to rounding.

e. - less than 0.05%.

Source: Industry survey, 1970.

f.b.m., however, there would be some double counting involved in this figure since some mills bought rough lumber for planing and resale. The reported volume of semi-processed lumber purchased by the sample of 98 mills was 26.1 million f.b.m. The estimate for the population would be in the order of 30 million f.b.m. Therefore, if this were subtracted from the estimated total sales, the actual sales would be about 229 million f.b.m. The volume of sales figure used, however, was 240.3 million, since this coincided with volume of input. Sales figures were obtained primarily to determine the degree of lumber processing and destination.

Estimated volume and value of softwood lumber amounted to about 224.7 million f.b.m. or about 94% of the total output. If the custom-sawn lumber is included, this figure is 233.1 million f.b.m. or about 97% of total output. Hardwood lumber accounted for the remaining 3%.

The value of lumber production for the industry in 1969 was about \$21.1 million (Table 20). Of this, softwood lumber accounted for about \$19.7 million, hardwood lumber about \$0.7 million, and custom lumber about \$0.7 million. The average value per M.f.b.m. was reported to be \$88 for softwood and \$94 for hardwood (value is f.o.b. mill). To arrive at a total value, the custom-sawn lumber was assumed to be of equal value to that for softwood lumber sawn independently.

The total value of lumber output by mill size class varied from about \$5.0 million in the class ≥ 6001 M.f.b.m., to \$0.6 million in the class 301-500 M.f.b.m. Average value per M.f.b.m. for softwood ranged from \$73 (301-500 M.f.b.m.) to \$106 (101-300 M.f.b.m.). Average value of hardwood lumber per M.f.b.m. varied from a low of \$70 (2001-3000 M.f.b.m.) to a high of \$135 (≤ 100 M.f.b.m.). It is difficult to identify the significance of these differences. Because the figures are only averages and since the accounting procedures vary so much among mills, further examination is probably not warranted.

It was mentioned in an earlier section, that it was important to determine the extent of processing of products, since further processing generally results in more employment and wages both directly and indirectly. In most cases, there would be more jobs associated with lumber manufacture than with export of the logs outside the province. Also, the more lumber processed, the greater would be the expected impact. Only softwood lumber was analysed as to degree of processing because of low volume of hardwood output and the small number of mills involved in the sample.

Table 20. Estimated volume and value of lumber output^a by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Softwood		Hardwood		Custom		Total	
	Output	Total Mean value value ^b	Output	Total Mean value value ^b	Output	Total Mean value value ^c	Output	Total Mean value value
>6001	54080	4921.3 91	660	51.5 78	0	0.0 -	54740	4972.8 91
3001-6000	53960	4532.6 84	1653	130.6 79	2374	199.4 84	57987	4862.6 84
2001-3000	31510	2898.9 92	120	8.4 70	204	18.8 92	31834	2926.1 92
1001-2000	42398	3561.4 84	2098	203.5 97	3142	263.9 84	47638	4028.8 85
501-1000	16230	1347.1 83	1775	174.0 98	963	79.9 83	18968	1601.0 84
301- 500	8430	615.4 73	111	8.3 75	32	2.3 73	8573	626.0 73
101- 300	11310	1198.9 106	191	18.0 94	712	75.5 106	12213	1292.4 106
< 100	6804	639.6 94	572	77.2 135	934	87.8 94	8310	804.6 97
Total	224722	19715.2 88	7180	671.5 94	8361	727.6 87	240263	21114.3 88

a. Output in M.f.b.m.; Mean value in \$/M.f.b.m.; Total value in \$'000.

b. Mean value is f.o.b. mill based on lumber sales.

c. Mean value is assumed to be the same as for softwood sales.

Source: Industry survey, 1970.

19,715.2
727.6
20,442.8

Table 21. Estimated volume of softwood lumber planed by mill size class in Nova Scotia, 1969^a

Mill size class (M.f.b.m.)	Planed		Unplaned		Total
	Volume (M.f.b.m.)	% of class output	Volume (M.f.b.m.)	% of class output	Volume (M.f.b.m.)
≥6000	20,010	37.0	34,070	63.0	54,080
3001-6000	28,545	52.9	25,415	47.1	53,960
2001-3000	24,294	77.1	7,216	22.9	31,510
1001-2000	19,206	45.3	23,192	54.7	42,398
501-1000	4,772	29.4	11,458	70.6	16,230
301- 500	1,905	22.6	6,525	77.4	8,430
101- 300	3,755	33.2	7,555	66.8	11,310
≤ 100	1,102	16.2	5,702	83.8	6,804
Total	103,589	46.1	121,133	53.9	224,722

a. Volumes are prorated on the basis of sales.

Source: Industry survey, 1970.

The amount of softwood lumber planed by mill size class is shown in Table 21. Since reported sales included some double counting, the volume of lumber planed was estimated by prorating production or output on the basis of the percentage of sales volume that was planed. Of the total softwood output of 224.7 million f.b.m., about 103.6 million f.b.m. or 46% was planed and 121.1 million f.b.m. or 54% was sold in the rough form (Table 21).

The mill size class with the highest proportion planed was the group 2001-3000 M.f.b.m. with 77.1%. Mills in the two largest size classes, ≥6001 and 3001-6000 M.f.b.m., planed only 37.0% and 52.9% respectively. This is due in part to the exports by these mills to the United Kingdom which has a tariff on planed lumber.

Virtually all softwood lumber sold by the sawmill industry in Nova Scotia in 1969 was sold green or only partially air-dried. For the sample, only one mill reported any substantial volume that was air-dried, and only two mills reported kiln-drying lumber, with a combined volume of only 628 M.f.b.m. It is obviously difficult to distinguish between what

is partial air-dried and air-dried but the latter was considered to be lumber with a moisture content below 19%.

In summary, slightly less than half of the softwood lumber produced in Nova Scotia in 1969 was planed and the majority was sold green or only partially air-dried. The distribution of lumber as analysed in the next section provides further information on the degree of processing and potential impact from other sectors.

Since estimated total sales of lumber amounted to more than production (due to intra-industry transfers and therefore double counting), sales to various locations were prorated to correspond with production. The average value per M.f.b.m. of sales was recorded to determine whether lumber values differed significantly by destination. These average values differ from those given in Table 20 because those in Table 20 were averages based on f.o.b. mill while those given for lumber to different markets were generally based on delivered prices.¹¹

Volume, value, and destination of softwood lumber is presented in Tables 22 to 26. Of the estimated sales (output) of 224.7 million f.b.m. of softwood lumber by sawmills in 1969, about 155 million f.b.m. or 69% was sold in Nova Scotia and the remaining 70 million f.b.m. or 31% was exported (Table 22).¹² These figures compare quite closely with those computed by the Maritime Lumber Bureau (see M.L.B. estimate). The value of softwood lumber sold within Nova Scotia was about \$94 per M.f.b.m. or a total of slightly more than \$14.6 million. The average value of lumber exported was about \$100 per M.f.b.m. and the total was about \$7 million.

Examination of the distribution of softwood lumber by the different size classes shows that the four mills in the largest size class (≥ 6001 M.f.b.m.) exported 81% of the total for the class. This compares with exports of about 34 and 17.5% respectively for the classes 3001-6000

¹¹ There is some justification for using the value of softwood lumber sales (in Table 22, of \$21,589.0 thousand) in the calculation of total value output of the industry (Table 19, p. 38). This would increase the value of output by about $\$21,589.0 - 19,715.2 = \$1,873.8$ thousand).

¹² It must be remembered that these sales volumes represent first destinations. Not included in the exports for example are sales from sawmills to brokers or shippers who in turn export the lumber. Exports of lumber would undoubtedly be higher than this figure. The amount would depend on the volume exported by these intermediaries.

Table 21: Estimated volume and value of reported lumber class, 1969

Mill size class (M.f.b.m.)	Sales in Nova Scotia			Exports			Total		
	Total		Mean ^c value	Total		Mean ^c value	Total		Mean value
	Volume	Percent		Volume	Percent		Volume	Percent	
>6001	10275	19.0	966.2	43805	81.0	4401.1	54080	100.0	5367.3
3001-6000	35452	65.7	3453.8	18508	34.3	1787.8	53960	100.0	5241.6
2001-3000	25996	82.5	2746.5	5514	17.5	542.0	31510	100.0	3288.5
1001-2000	40702	96.0	3831.7	1696	4.0	200.1	42398	100.0	4031.8
501-1000	16230	100.0	1379.9	0	.0	.0	16230	100.0	1379.9
301- 500	8430	100.0	690.4	0	.0	.0	8430	100.0	690.4
101- 300	11310	100.0	1027.9	0	.0	.0	11310	100.0	1027.9
< 100	6634	97.5	546.3	170	2.5	15.3	6804	100.0	561.6
Total	155029	69.0	14642.7	69693	31.0	6946.3	224722	100.0	21589.0
Estimate ^d	140803	70.3	-	59556	29.7	-	200359	100.0	-

a. Volumes were prorated on the basis of reported sales.

b. Volume in M.f.b.m.; Percent of total for mill size class; Mean value in \$/M.f.b.m.; Total value in \$'000.

c. Value per M.f.b.m. is that reported for sales. For sales in Nova Scotia, price was generally a delivered price. For exports, the price given might have been at dockside or it might have included some transportation charges.

d. Estimated by the Maritime Lumber Bureau.

Source: Industry survey, 1970; M.L.B., 1969.

Table 23. Estimated volume^{a,b} of softwood lumber sold in Nova Scotia by destination and mill size class, 1969

Mill size class (M.f.b.m.)	Construction		Planing mills		Other processors ^c		Retailers, brokers, etc.		Total	
	Volume	Percent	Volume	Percent	Volume	Percent	Volume	Percent	Volume	Percent ^d
>6001	3093	30.1	6124	59.6	688	6.7	370	3.6	10275	100.0
3001-6000	22795	64.3	0	.0	5460	15.4	7197	20.3	35452	100.0
2001-3000	21265	81.8	0	.0	494	1.9	4237	16.3	25996	100.0
1001-2000	11153	27.4	8140	20.0	2035	5.0	19374	47.6	40702	100.0
501-1000	7498	46.2	5064	31.2	1428	8.8	2240	13.8	16230	100.0
301-500	1905	22.6	4620	54.8	0	.0	1905	22.6	8430	100.0
101-300	7589	67.1	1663	14.7	1052	9.3	1006	8.9	11310	100.0
< 100	1599	24.1	710	10.7	550	8.3	3775	56.9	6634	100.0
Total	76897	49.6	26321	17.0	11707	7.6	40104	25.9	155029	100.0

a. Volumes were prorated on the basis of reported sales.

b. Volume in M.f.b.m.; Percentage of total for mill size class.

c. Includes treating plants, furniture manufacturers, etc.

d. May not add to 100.0 due to rounding.

Source: Industry survey, 1970.

and 2001-3000 M.f.b.m. Although some lumber was exported by two of the smaller size classes, the percentage was not significant.

As explained earlier, it is important to know the degree of processing or use of the product, in this case lumber, since a higher level of processing generally means more employment, higher income, and so forth. Volume of lumber sales in Nova Scotia by destination is shown in Table 23.

Of the total local shipments of about 155 million f.b.m., almost 50% or 76.9 million f.b.m. was sold for construction, that is to building contractors, individuals, and so on. About 17% was sold to planing mills, 7.6% to other processors, and about 26% to retailers and brokers. Analysis of the distribution patterns of the various size classes reveals that a relatively high proportion of the 10.3 million f.b.m. sold in Nova Scotia by the largest class, went to planing mills. The size classes 3001-6000 and 2001-3000 M.f.b.m. sold a high percentage of their total to construction and nothing to planing mills. The fourth largest class (1001-2000 M.f.b.m.) distributed almost 48% of its sales within Nova Scotia to retailers and brokers.

To determine whether there were any significant differences in the average value of lumber sales to various uses or destinations by size classes, the figures in Table 24 were calculated. For the industry as a whole, the average value of softwood lumber was highest (\$100 per M.f.b.m.) for that going to construction, while that going to planing mills was lowest (\$86 per M.f.b.m.). This trend, however, is not consistent for the various size classes.

Destination of softwood lumber exported by volume and value is shown in Tables 25 and 26. Of the total estimated export of about 69.7 million f.b.m. in 1969, about 35.5% went to the rest of Canada, 10.3% to the United States, 45.0% to the United Kingdom, and about 9.2% went to other areas such as Barbados, Jamaica, and so on.

Average value per M.f.b.m. of shipments to the various locations was about \$100. This was about \$6 per M.f.b.m. higher than the average value of sales within the province. The average value was highest for shipments to the United States (\$109 per M.f.b.m.),¹³ while that shipped to other areas in Canada had a slightly lower average value (\$105 per M.f.b.m.).

¹³ Lumber demand was unusually high in the United States and Canada in 1969 due to poor weather on the West Coast, labor problems, and so on.

Table 24. Estimated value^{a,b} of softwood lumber sales in Nova Scotia by destination and mill size class, 1969

Mill size class (M.f.b.m.)	Construction			Planing mills			Other processors			Retailers, brokers, etc.			Total	
	Total value	Mean value		Total value	Mean value		Total value	Mean value		Total value	Mean value		Total value	Mean value
>6001	321.7	104		526.7	86		77.1	112		40.7	110		966.2	94
3001-6000	2302.3	101		.0	-		475.0	87		676.5	94		3453.8	97
2001-3000	2232.8	105		.0	-		51.9	105		461.8	109		2746.5	106
1001-2000	1137.6	102		765.2	94		185.2	91		1743.7	90		3831.7	94
501-1000	667.3	89		405.1	80		117.1	82		190.4	85		1379.9	85
301-500	158.1	83		374.2	81		.0	-		158.1	83		690.4	82
101-300	705.8	93		144.7	87		98.9	94		78.5	78		1027.9	91
< 100	139.1	87		54.0	76		55.0	100		298.2	79		546.3	82
Total	7664.7	100		2269.9	86		1060.2	91		3647.9	91		14642.7	94

a. Value per M.f.b.m. is that reported for sales. In most cases, it was delivered price of lumber.

b. Mean value in \$/M.f.b.m.; Total value in \$'000.

Source: Industry survey, 1970.

Table 25. Estimated volume of softwood lumber^a exported from Nova Scotia by geographic destination and by mill size class, 1969

Mill size class (M.L.B.m.)	Rest of Canada		U.S.		U.K.		Other ^b		Total	
	Volume	Percent	Volume	Percent	Volume	Percent	Volume	Percent	Volume	Percent
>6001	13317	30.4	6439	14.7	23830	54.4	219	0.5	43805	100.0
3001-6000	8643	46.7	722	3.9	2961	16.0	6182	33.4	18508	100.0
2001-3000	904	16.4	0	.0	4610	83.6	0	.0	5514	100.0
1001-2000	1696	100.0	0	.0	0	.0	0	.0	1696	100.0
501-1000	0	.0	0	.0	0	.0	0	.0	0	-
301-500	0	.0	0	.0	0	.0	0	.0	0	-
101-300	0	.0	0	.0	0	.0	0	.0	0	-
<100	170	100.0	0	.0	0	.0	0	.0	170	100.0
Total	24740	100.0	7161	100.0	11401	100.0	6401	100.0	69693	100.0
Estimate ^c	21000	100.0	10021	100.0	23600	100.0	2770	100.0	59356	100.0

a. Volume in M.L.B.m.; Percentage of total exported for newmill size class.

b. Includes St. Pierre-Miquelon, West Indies, Jamaica, Barbados, etc.

c. Estimate by Maritime Lumber Bureau.

d. In this estimate, 21.5% of volume in to Newfoundland, and 17.6% in to Quebec and points west.

e. Includes U.K., Northern Ireland, and Irish Free State.

Source: Industry survey, 1970; M.L.B., 1969.

Table 26. Estimated value of softwood lumber^a exported by destination and mill size class, 1969

Mill size class (M.f.b.m.)	Rest of Canada		U.S.		U.K.		Other		Total	
	Total value	Mean value	Total value	Mean value	Total value	Mean value	Total value	Mean value ^b	Total value	Mean value
>6001	1432.2	108	708.3	110	2240.0	94	20.6	94	4401.1	100
3001-6000	847.0	98	72.2	100	281.3	95	587.3	95	1787.8	97
2001-3000	99.4	110	.0	-	442.6	96	.0	-	542.0	98
1001-2000	200.1	118	.0	-	.0	-	.0	-	200.1	118
501-1000	.0	-	.0	-	.0	-	.0	-	.0	-
301- 500	.0	-	.0	-	.0	-	.0	-	.0	-
101- 300	.0	-	.0	-	.0	-	.0	-	.0	-
< 100	15.3	90	.0	-	.0	-	.0	-	15.3	90
Total	2594.0	105	780.5	109	2963.9	94	607.9	95	6946.3	100

a. Mean value in \$/M.f.b.m.; Total value in \$'000.

b. Mean value of exports to other areas based on Mean value of shipments to U.K.

Source: Industry survey, 1970.

The significance of these differences in volumes and values for different locations and mill size classes is not too apparent. The estimates for volume of sales locally and for export are probably reasonably accurate. Also, the distribution by user in Nova Scotia and by specific export destination are probably reliable. However, because values given were averages and because there was a reasonably high variability, it is felt that data are not sufficient to draw specific conclusions, especially regarding different mill size classes.

In summary, although about 50% of all lumber was planed, there was very little other processing. Some lumber was sent to treating plants, and small amounts were used for boxes, lobster traps, boats, and furniture.

The estimated value of chips produced by sawmills in Nova Scotia in 1969 was about \$2.3 million or about 9.4% of the total value of output of the industry (Table 19). For the mills producing >2001 M.f.b.m., however, chips accounted for 12-15% of the total value of output. By volume, the estimated chip production was about 131.5 thousand units or cords.¹⁴ The Department of Lands and Forests estimate of chip production for 1969 was about 121 thousand cords. The pulp and paper industry reported using about 139 thousand cords of chips in addition to the roundwood input.

Estimated volume and value of chips produced by mill size class are shown in Table 27. Mills of size classes <1000 M.f.b.m. produced no chips. Average value per unit at the sawmill was between \$17 and \$18.¹⁵

Chips produced per M.f.b.m. of lumber (for mills producing some chips) varied from 0.40 units to 1.67 units. Output of chips is plotted by mill size in Fig. 3. An average is presented for the four mills in the largest size class so as not to divulge specific lumber production figures. Average number of units of chips produced per M.f.b.m. for all mills producing chips was 0.38. By mill size class, units of chips per M.f.b.m. of lumber varied between 0.79 (for the class 3001-6000 M.f.b.m.)

¹⁴ One unit is about 85 ft³ of solid wood or about 205 ft³ by volume. Two green tons of chips are roughly equivalent to 1 unit (See N.S. Dep. Lands & Forests 1970).

¹⁵ Pulp and paper mills reported an average cost of about \$21 per cord for chips at the pulp mill. This difference in value would be the transportation costs.

Table 27. Estimated volume and value of chips produced by mill size class in Nova Scotia, 1969

Mill size class (M.f.b.m.)	Sample size	Volume (Units) ^a	Value per unit ^b (\$)	Total value (\$'000)
>6001	4	50,154	17	864.6
3001-6000	12	39,651	17	678.2
2001-3000	10	26,892	18	484.1
1001-2000	5	14,790	17	251.4
≤1000	0	0	-	.0
Total	31	131,487	17	2,278.3

a. One unit of chips is equivalent to 205 ft³ by volume or about 85 ft³ of solid wood. Two green tons are equal to about 1 unit.

b. Average value is that of chips at sawmill.

Source: Industry survey, 1970.

and 0.95 (for the class 2001-3000 M.f.b.m.). Units of chips per M.f.b.m. for the four largest mills averaged 0.93. The reason for the variability here might be due to different average size of sawlogs or policy of the mill toward proportion of the log that should be chipped. Differences might also reflect the fact that some mills might be chipping roundwood, and therefore, the units of chips produced would have little correlation with lumber production. As shown in Fig. 3, however, the output of chips is closely tied to lumber output, and the average of about 0.9 units of chips per M.f.b.m. of lumber is consistent for most mills.

Output of other products was not too significant, except for the two smallest size classes. Slabwood accounted for 1-2% of the total value for the mills producing <2000 M.f.b.m. For the mills <1000 M.f.b.m. other products such as railway ties, mine timbers, and box shooks made up about 5-15% of the value of output.

E. DIRECT IMPACT OF THE PULP AND PAPER INDUSTRY IN NOVA SCOTIA

As was mentioned earlier, due to the confidential nature of some of the data and the small number of mills involved, it was necessary to combine data for all mills. Also, it should be pointed out again that a hardboard mill was included with the five pulp and paper mills. Because

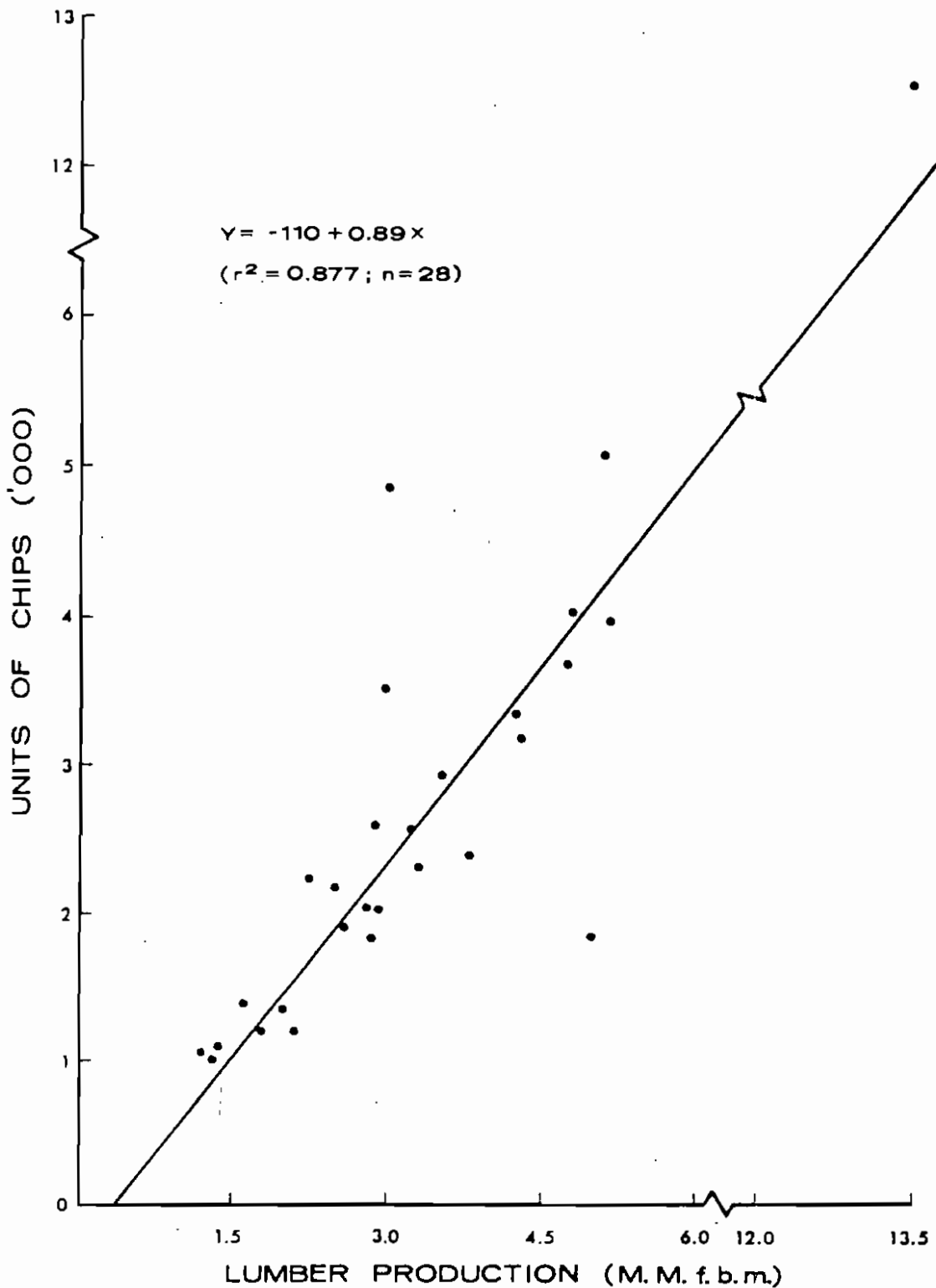


Fig. 3. Units of chips produced by mill size class in Nova Scotia, 1969

of the sizeable volume of wood and other inputs, it was felt that this mill should be included in the analysis. The results indicate that the inclusion of the hardboard mill does not distort other data markedly.

The first part of this section is a brief description of the

history and development of the pulp and paper industry in the province. This will serve in some respects to show the heterogeneity of the industry and the derivation of impact.

The second part is a short description of capital investment in the industry. This information is useful for comparison with other sectors or industries and in comparison with impact.

Part three is devoted to an analysis of the direct inputs and output of the industry. This includes specific analysis of volume, value, and origin of inputs as well as outputs. Employment is analysed as to seasonality, wages paid, and so on. Inputs are also compared with those of the industry in Ontario.

*1. History and Development of the Industry*¹⁶

Although there was a newsprint mill in Nova Scotia as early as 1819, the first mill to use wood for pulp was not built until 1875. This mill, the St. Croix Mill, was located near Windsor and exported pulp to France and later to England. The mill burned in 1885. Between 1875 and 1903, other mills were built at Salter's Falls (1880), Sheet Harbour (1885), Milton near Liverpool (1893), New Germany (1893), Sissibou Falls (1894), Weymouth Falls (1901), and Cowie's Falls (1901). It is reported that the only mill operating in 1903 was the groundwood mill at Salter's Falls. This mill burned in 1947.

The pulp mill built at Sheet Harbour in 1885 is reported to have been the first sulphite mill in Canada (Donaldson 1961). The mill owned by the Halifax Wood Fibre Co. was closed in 1891 as a result of a duty imposed on sulphite pulp being exported to the United States. The mill was destroyed by fire about 1896. The report states that this mill employed 20 to 25 men "... working a single 12 hour shift. Unskilled labour received 7 to 10 cents per hour, and skilled labour 15 cents. Pulpwood was delivered to the mill at \$3.00 per cord."

The Scott pulp mill¹⁷ presently located at Sheet Harbour was built around 1924 by the American Perforated Wrapping Paper Co. of New York. In 1933, the name of the company changed to the Halifax Power and Pulp Co. Ltd. In 1963, the mill was acquired by Fraser Companies Ltd. and by Scott Paper Co. in 1964.

¹⁶Primary source of data was Donaldson (1961), see also Anon. (1963).

¹⁷For locations of pulp and paper mills in Nova Scotia at present, see Fig. 1 (page 9).

The present Minas Basin Pulp and Power Co. mill at Hantsport is reported to have been built in 1928 by the Avon Power and Pulp Company at White Rock in Kings County. The mill was moved from there to its present location.

In 1928-1929, the Mersey Paper Co. Ltd. purchased the holdings near Milton and built a newsprint mill at Liverpool. This mill was acquired by the Bowaters Corporation of North America and subsequently became the Bowaters Mersey Paper Co. Ltd.

The Nova Scotia Pulp Ltd. sulphite mill at Point Tupper was established in 1959. However, production did not start until 1962. Expansion of the pulp mill and the addition of newsprint production facilities have just been completed. Since information in this report refers to 1969, the effects of these changes are not shown. Before the expansion program, the company was jointly owned by Stora Kopparbergs Bergslags A B of Sweden (80%) and Scott Paper Co. (20%). The company name is now the Nova Scotia Forest Industries Ltd. and is a wholly owned subsidiary of Stora Kopparbergs.

The Scott Paper Co. sulphate pulp mill at Abercrombie was built in 1967.

The Anil Canada Ltd. hardboard plant was constructed in 1967. The mill capacity was doubled in 1970-71.

2. Capital Investment in the Industry

Investment in the five pulp and paper mills plus the hardboard mill in Nova Scotia in 1969 is estimated at about \$180 million. Although information received from the companies via the questionnaire was not complete, there are estimates in various other reports. A.D.B. (1968) lists the mills by type of product, capacity, capital value, and so forth for 1965. Some of this information is shown in Table 28.

These data are verified by a report of the N.S. Voluntary Planning Board (1966) which states, "The existing capacity has been estimated to represent a total investment (original capital plus repair and maintenance) of 120 million dollars. The capital investment in the new mill [at Abercrombie] has been estimated at in excess of 50 million dollars, and that plus the value of the current expansion programme to the existing chemical capacity in the province, brings the total to about 175 million dollars".

Table 28. Output capacity and investment of pulp and paper mills in Nova Scotia, 1965

Location	Type of mill	Capacity		Capital value (\$ million)
		/day (tons)	/year ('000 tons)	
Liverpool	Newsprint	500	180.0	50.0
	Groundwood	-	-	-
	Sulphite	-	-	-
Hantsport	Groundwood	100	33.0	1.3
	Paperboard	40	12.0	1.7
Port Hawkesbury	Bl. sulphite	350	130.0	50.0
Sheet Harbour	Groundwood	100	26.5	1.3
Abercrombie	Sulphate	500	150.0	50.0
Total		1590	531.5	154.3 ^a

a. Due to an error in addition, this figure was given as 184.3 in the original report.

Source: A.D.B., 1968.

Initial capital investment in the plant of Anil in 1967 was reported to be about \$8.5 million. The expansion of the plant in 1970-71 was estimated to increase investment by \$8 million.

Depending on the definition of investment, the value may vary considerably but for purposes of this report is assumed to be about \$150-200 million. This does not include present expansion of Nova Scotia Pulp Ltd. at Port Hawkesbury which is expected to amount to about \$60 million, nor does it include recent modernization of the paperboard mill by Minas Basin Pulp and Paper Co. Ltd. (March 1971).

3. Direct Impact of the Industry

The direct impact of the pulp and paper industry is the employment, salaries and wages paid, materials, supplies, and services purchased, and so forth. These purchases, of course, result in income and employment to others. The latter effects are considered to be indirect effects and are analysed with indirect effects of the sawmill industry in the next section.

Inputs are initially segregated into various categories. These include: fuel and electricity; wood; paper stock, paper, and paperboard; chemicals; containers; packaging materials, etc.; operating and maintenance supplies; labor; and other.

The wood inputs constituted 27.7% of the total inputs of the pulp and paper mills in Nova Scotia for 1969 (Table 29) - the largest single input item (disregarding the category that could not be identified specifically). The other inputs in order of importance were: labor (20.3%); chemicals (9.0%); operating and maintenance supplies (6.1%); and fuel and electricity (5.2%). Office supplies, paper stock, paper and paperboard, containers, etc., each amounted to less than 1% of the total.

About 29.6% of the total inputs was not identified specifically. These inputs would include taxes, profit, depreciation, rent, interest, and so forth. Value added (value of shipments minus the cost of materials and supplies and fuel and electricity, adjusted for changes in inventory) was about \$39.2 million or about 50% of the value of shipments or total inputs.

Table 29 also indicates the proportion of inputs purchased locally. Simply because materials were purchased locally, however, does not mean that they were produced there. Some materials and supplies may be purchased from the local hardware store, but produced in central Canada or the United States. This column shows that most of the fuel and electricity, wood, paper stock, paper, and office supplies were purchased in Nova Scotia. Chemicals, containers, and operating and maintenance supplies were acquired mainly outside the province. These latter three groups of items make up roughly 15% of the total inputs or about \$12.4 million. Of this amount, only about \$1.2 million worth was reported to have been purchased in the province. Of the \$23.2 million of inputs not identified specifically, it is not possible to identify what proportion remained in the province.

Fuel and electricity amounted to about \$4.1 million or about 5.2% of the total value of inputs of the pulp and paper mills in Nova Scotia in 1969 (Table 30). Of this amount, fuel oil accounted for about 53.4% and electricity about 46.3%. These inputs were all reported to be purchased in Nova Scotia.

Table 29. Summary of the inputs^a of pulp and paper mills in Nova Scotia, 1969

Type of input	Total value (\$'000)	Percent of total input	Amount from Nova Scotia	
			Value (\$'000)	Percent
1. Fuel & electricity	4,091	5.2	4,091	100.0
2. Wood	21,753	27.7	21,383	98.3
3. Paper stock, paper and paperboard	442	0.6	309	69.9
4. Chemicals	7,032	9.0	403	5.7
5. Containers, packaging	588	0.7	43	7.3
6. Operating & maintenance supplies	4,814	6.1	730	15.2
7. Office supplies	89	0.1	89	100.0
8. Amount paid others ^b for work done	564	0.7	564	100.0
Sub total (1-8)	39,373	50.1	27,524	69.9
9. Wages and salaries	15,965	20.3	15,965	100.0
10. Not identified specifically ^c	23,223	29.6	NA	NA
Sub total (9 + 10)	39,188	49.9	NA	NA
Total inputs (1-10)	78,561	100.0	NA	NA

a. Inputs, with the exception of office supplies and salaries and wages, include only those used in manufacturing activity (as opposed to total activity), and do not include goods purchased for resale.

b. Amount paid others for work done includes payment to others for custom work. This is assumed to originate in the province.

c. This category includes profits, taxes, depreciation, rent and interest, and so forth. The figure was arrived at by subtracting value of other inputs (inputs 1-9) from total inputs which is the total value of shipments of own manufacture as reported in D.B.S. 1969a.

Source: Industry survey, 1970, and D.B.S., 1969a.

Table 30. Value of fuel and electricity inputs into pulp and paper mills in Nova Scotia, 1969

Type of input	Value at mill (\$'000)	Percent of total fuel and electricity
Coal	1.3	- ^a
Gasoline	10.1	0.2
Fuel oil	2,185.4	53.4
Electricity	1,894.5	46.3
Total	4,091.3	100.0

a. - less than 0.1%

Source: Industry survey, 1970.

Wood was the largest single input of pulp and paper mills in Nova Scotia. In 1969, this input amounted to about \$21.8 million or about 27.7% of the total input for the industry. The volume and value of wood used is summarized in Table 31. The total volume of wood used was reported to be 1,043.4 thousand cords. Of this amount, about 139 thousand cords or 13.4% was in the form of chips, and about 9.3 thousand cords (or equivalent) in pulp purchased elsewhere. Of the remaining 894.7 thousand cords of roundwood, about 770.9 thousand cords were softwood (86.2% of roundwood) and the remaining 123.8 thousand cords were hardwood.

Of the total roundwood production (894.7 thousand cords), about 639.8 thousand cords (or 71.5%) was reported to be purchased by the companies. The remaining 254.9 thousand cords were produced by the companies.

The total value of this wood input was reported to be \$21.8 million or an average of \$20.85 per cord. The cost of wood chips was estimated to be about \$21.03 per cord. The average cost of all roundwood used was \$20.62. Average softwood roundwood value was about \$21.04 per cord, and hardwood was about \$18.05. Roundwood purchased by the companies was reported to average about \$20.42, as opposed to an average cost of \$21.12 for wood produced by the companies.

Only a small amount of roundwood was brought in from outside Nova Scotia. The majority of wood pulp used (total volume of 9,313 cords, 15% from Nova Scotia) was imported.

Table 31. Volume, value, and origin of wood used by pulp and paper mills in Nova Scotia, 1969

Type of wood	Total volume (cords)	Total value (\$)	Average value (\$/cord)	Volume from Nova Scotia	
				Cords	Percent
Roundwood					
own production					
softwood	193,211	4,202,198 ^a	21.75	193,211	100.0
hardwood	61,668	1,181,362	19.16	61,668	100.0
sub-total	254,879	5,383,560	21.12	254,879	100.0
purchased					
softwood	577,733	12,015,071 ^b	20.80	567,879	98.3
hardwood	62,112	1,052,271	16.94	62,112	100.0
sub-total	639,845	13,067,342	20.42	629,991	98.5
Total roundwood					
softwood	770,944	16,217,269	21.04	761,090	98.7
hardwood	123,780	2,233,633	18.05	123,780	100.0
total	894,724	18,450,902	20.62	884,870	98.9
Wood chips ^c	139,411	2,931,944 ^d	21.03	139,411	100.0
Wood pulp ^c	9,313 ^e	370,078	39.74	1,397	15.0
Total all wood					
softwood	919,668	19,519,291	21.22	901,898	98.1
hardwood	123,780	2,233,633	18.05	123,780	100.0
total	1,043,448	21,752,924	20.85	1,025,678	98.3

- a. Cost of wood not available for one mill. Value computed from weighted average value of wood for two other mills which produced own roundwood.
- b. Cost of wood not available for one mill. Value computed from weighted average value of wood for four other mills which purchased some roundwood.
- c. All wood chips and wood pulp purchased was assumed to be softwood.
- d. Cost of chips not available for one mill. Value computed from weighted average value of chips for two other mills which purchased chips.
- e. Wood pulp was reported as 6,985 tons. Converted to cords by using a factor of 1500 lbs. of moisture-free pulp per cord of wood for balsam fir, using groundwood process.

Source: Industry survey, 1970.

Only a very small amount of paper stock was used as an input by the pulp and paper mills in Nova Scotia. This amounted to about \$4.42 thousand or about 0.6% of the total input of the industry in 1969. About 70% of this amount was said to have originated in Nova Scotia.

Chemicals accounted for about 9.0% of the inputs into pulp and paper mills. The cost of chemicals used was reported to be about \$7 million (see Table 29). The major chemicals used in order of importance were chlorine, sodium hydroxide, caustic soda, sulphur and sodium chlorate. These five chemicals accounted for approximately \$4.6 million or about 65.6% of the total chemicals used.

As was indicated in Table 29, only 5.7% of the total value of chemicals used originated in Nova Scotia. This dependence on chemicals from Nova Scotia is expected to go up upon completion of the new chemical plant in Abercrombie. One of the pulp and paper mills reported that chlorine, sodium chlorate, sodium chloride, and caustic soda would be supplied by Canso Chemicals after 1970. In 1969, these chemicals used by pulp and paper mills amounted to about \$2.8 million or about 40% of the total value of chemicals used.

Containers and other packaging materials includes steel strapping, mill wrappers, metal caps, flanges, and so forth. In 1969, these inputs amounted to about \$588 thousand or about 0.7% of the total input. About 7.4% or \$43 thousand dollars of these inputs were purchased in Nova Scotia.

Operating and maintenance supplies includes those supplies such as fourdrinier wires, felts, spool heads, and so forth. In 1969, these inputs amounted to \$4.8 million. The amount of these items from Nova Scotia was about 15.2%.

Office supplies amounted to about \$89 thousand or about 0.1% of the total input of mills. In the questionnaire, these supplies were reported under the major category of "non-manufacturing" inputs. This category also includes goods purchased for resale, materials and supplies used in construction by own labor forces, and so on. These non-manufacturing inputs are not included in the materials and supplies used in the classification of "manufacturing activity" in the Statistics Canada (formerly D.B.S.) publications.

Office supplies were separated from other non-manufacturing inputs for this report, in part, to permit comparison with data for another province (see footnote a, Table 29). It is felt that the office supplies reported is underestimated, however, the proportion of the total inputs is probably too small to warrant further consideration.

Amount paid others for work done includes payment to others for work done on materials owned by the reporting establishment (see footnote b, Table 29). The amount of this input in 1969 was about 0.7% of the total input, or about \$564 thousand. The entire amount was assumed to originate in Nova Scotia.

The total of inputs (items 1-8, Table 29) are generally classed as intermediate inputs, or, fuel and electricity, and materials and supplies. These represent the major commodity inputs. The difference between these inputs and the total value of inputs or value of shipments is roughly equivalent to value added or net value of production.

There was some discrepancy in the figures reported for number of employees and salaries and wages in the industry survey questionnaires as compared to the information reported by Statistics Canada (D.B.S. 1969) (Table 32). This should not be the case since a similar form was used. The reported number of employees in the industry survey was 2,130 while that reported by Statistics Canada was 2,080. The largest discrepancy, however, appeared in the wages and salaries. In the industry survey, the amount of salaries and wages paid was not reported by one firm. Even though this figure was estimated by multiplying the man-hours paid by the weighted average hourly wage of the remaining five mills, the total wages and salaries estimated for the industry was about \$1.4 million less (about 9%) than that reported by Statistics Canada.

Some indication of the seasonality of employment may be obtained from Fig. 4, which shows the number of employees in manufacturing operations by month.

Inputs which could not be identified specifically amounted to about \$23.2 million or about 29.6% of the total inputs (Table 29). This category includes business expenses, taxes, profits, rent, interest, and depreciation. This figure was obtained by finding the residual of total inputs minus fuel and electricity, materials and supplies, and wages. Only three of the pulp and paper mills provided any information on this section of the questionnaire and much of this information was incomplete. The remaining three mills felt that the information requested regarding profits, taxes, and so on was too confidential. The proportion of this \$23.2 million that originated or remained in the province is not known. A large proportion of the business expenses and services probably were

Table 32. Employment and wages in pulp and paper mills in Nova Scotia, 1969

Category	Average number employed		Man hours paid ('000)	Salaries and wages (\$'000)	Average wage per hour (\$/hour)
	Male	Female			
Administrative & Office	426	87	NA ^a	4,633	NA
Sales & Distribution	9	1	NA	57	NA
Sub-total	435	88	NA	4,690	NA
Production & Related					
Manufacturing	1521	3	33,538	11,063	3.13
Other	33	0	NA	212	NA
Sub-total	1554	3	NA	11,275	NA
Total	1989	91	NA	15,965	NA

a. Not available.

Source: D.B.S., 1969.

local. Presumably, profit was distributed to shareholders, and it is probably safe to assume that the major part of this was distributed outside the province. Unless the amount of equipment and machinery used up (depreciation) was purchased in the province, this could not be considered to have a beneficial local effect.

To check the consistency and reliability of data for the industry, a comparison was made with information available from Ontario (Table 33). This comparison indicates that although the data are for different provinces, different years, and for a different number of mills, the proportion of the total input made up by various categories does not vary significantly.

Wood and paperstock constituted 28.3% of the total value of inputs in Nova Scotia and 27.6% in Ontario (Table 33). Relatively, the value of chemicals accounted for a slightly higher proportion of total inputs in Nova Scotia (9.0%) than in Ontario (7.6%). The value of wages and salaries in Nova Scotia made up a smaller proportion of total inputs than in Ontario.

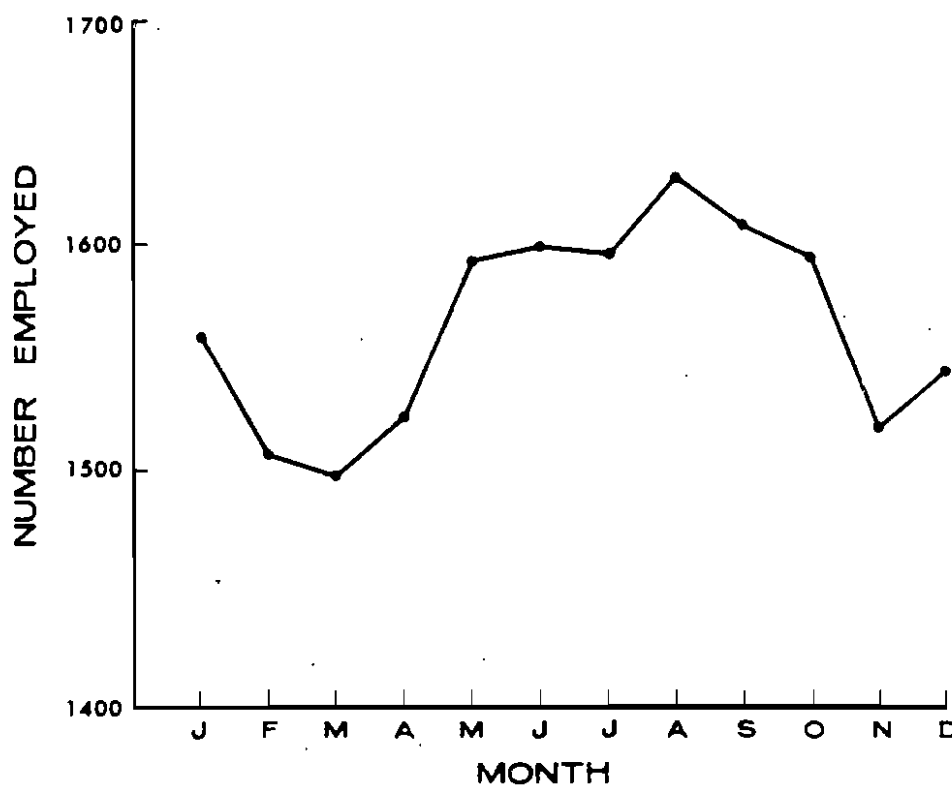


Fig. 4. Number of employees in manufacturing operations by month in pulp and paper mills in Nova Scotia, 1969.

Source: Industry survey, 1970.

Because of the obvious differences in number of mills, the year to which the data refer, and so on, too much importance should not be placed on these comparisons. The information, however, is useful in that it provides a check on the reliability of data.

Table 33. Comparative summary of inputs of pulp and paper mills in Nova Scotia, 1969, and Ontario, 1966

Type of input	Nova Scotia, 1969		Ontario, 1966	
	Total value (\$'000)	Percent of total input	Total value (\$'000)	Percent of total input
1. Fuel & electricity	4,091	5.2	41,390	6.7
2. Wood	21,753	27.7	171,390	27.6
3. Paperstock, paper & paperboard	442	.6		
4. Chemicals	7,032	9.0		
5. Containers & packaging	588	.7	7,360	1.2
6. Operating & maintenance supplies	4,814	6.1	32,930	5.3
7. Office supplies	89	.1	700	.1
8. Paid others for work done	564	.7	NA	NA
Sub-Total (1-8)	39,373	50.1	300,800	48.4
9. Wages & salaries	15,965	20.3	140,783	22.6
10. Not identified specifically	23,223	29.6	180,519	29.0
Sub-Total (9 & 10)	39,188	49.9	321,302	51.6
Total inputs	78,561	100.0	622,102	100.0
(Selling value of shipments)				
No. of establishments	6		36	
No. of employees	2,080		21,811	

Source: Industry survey, 1970; D.B.S., 1969a; Ont. Dep. Lands & Forests, 1969.

The output of manufactured goods¹⁸ by the pulp and paper industry in Nova Scotia in 1969 was about \$78.6 million,¹⁹ of this about 3.4% or \$2.7 million was sold within the province. The primary products were unbleached groundwood pulp, bleached sulphite pulp, groundwood pulp and paperboard, kraft pulp, newsprint, and hardboard. The mill capacities and output are shown in Table 34.

¹⁸ Manufactured goods are those produced by the mill. Not included in this category are goods purchased for resale. The value of non-manufactured goods for Nova Scotia in 1969 is estimated to have been about \$90,000.

¹⁹ This is the "value of shipments of goods of own manufacture" reported by D.B.S. (1969a).

Table 34. Capacity and output of the pulp and paper mills in Nova Scotia, 1969

Location	Product	Capacity		Output ('000 tons)
		/day (tons)	/year ('000 tons)	
Liverpool	Newsprint	NA ^a	194.5	182.2
Hantsport	Groundwood	NA	13.0	11.0
	Paperboard	NA	20.0	14.0
Port Hawkesbury	Bleached sulphite	385	135.0	135.0
Sheet Harbour	Groundwood	100	34.5	34.5
Abercrombie	Bleached sulphate	550	187.0	187.0
East River	Hardboard	NA	145.0 ^b	145.0 ^b

a. Not available.

b. Capacity and output in million ft² (1/8-inch basis); equivalent to about 50,000 tons/year.

Source: Company returns.

In terms of the degree of processing in the industry, it is evident that with the exception of newsprint production at Liverpool and the production of paperboard at Hantsport, the processing of pulp is very limited. As was mentioned earlier, however, the mill at Port Hawkesbury has just installed newsprint production facilities.

C. INDIRECT IMPACT OF SAWMILLS AND PULP AND PAPER MILLS IN NOVA SCOTIA

In previous sections, it was found that the production of about \$24.2 million of sawmill products required inputs of about 240 million f.b.m. of sawlogs,²⁰ valued at \$13.1 million; 2,261 employees whose wages and salaries amounted to about \$8.1 million; fuel and electricity at \$1 million; and taxes, services, and so on. The production of \$78.6 million of pulp and paper products required over 1 million cords of wood valued at about \$21.8 million; 1,989 employees at a cost of about \$16 million; chemicals valued at \$7 million; and so on. Although there was an attempt to determine the geographic origin of the inputs, there was no estimation of the employment and income generated indirectly outside the two industries.

²⁰On the basis of product only, roundwood used was more than this (see Table 37).

In the definition of economic impact, it was explained that because industries hire labor and buy goods and services, additional income and employment are created. Industries such as sawmilling and pulp and paper hire labor to which they pay salaries and wages. These salaries and wages are spent by labor for groceries, rent, and so forth. Consequently, grocers are employed and landlords receive rents. In addition to labor, mills buy wood, gasoline, insurance, and so on. Loggers, fuel distributors, and insurance salesmen are employed. Payments to labor and purchases of goods and services have a multiplying effect.

The extent of the multiplying effect depends on a number of factors. The indirect effect of payments to labor depends on what people do with their money - what proportion is spent as opposed to saved, the type of goods purchased, and so forth. The indirect effect of purchases of goods and services depends on the amount of labor and materials used in their production. Different goods require different amounts of labor.

To compare the indirect effects of various industries or mills, one would have to follow through all the repercussions of the purchases by these mills. One would have to determine, for example, the labor required and wages paid to loggers, the equipment they use, the suppliers of equipment, and so on. The same approach would have to be taken for each input.

This series of effects can be simplified and determined by a technique called input-output analysis. As the name implies, inputs and outputs of industries are identified and analysed. By analysing these interactions simultaneously, one can derive a factor or number showing direct and indirect effects of say \$1000 of output of an industry or mill. The ratio of the total effect (direct and indirect) to the direct effect is commonly denoted as the multiplier. If one is concerned with employment, the number of employees directly and indirectly required for each unit of output, say \$1 million, is determined. This total employment divided by direct employment equals the employment multiplier.

Since it was not possible to follow through the series of interactions for all industries affected, and since no data existed for 1969, D.B.S. input-output tables for 1960 were used to estimate indirect effects. This information obviously has to be used with the limitations, qualifications, assumptions, and so on, in mind. Data on indirect effects and

multipliers from other sources were analysed and compared with the data available for Nova Scotia.

1. *Indirect Impact on Employment*

The input-output tables for 1960 show the interactions for 58 industries or sectors. Data for selected industries are shown in Table 35. The miscellaneous wood products industry or sector has the highest direct employment per \$1 million of output while petroleum refining has the lowest (Table 35). The sawmill sector required 86 persons directly per \$1 million of output while pulp and paper required only 59. According to the D.B.S. input-output tables for 1960, sawmills produced about \$23.8 million of output and employed about 2052 persons.²¹ In 1960, pulp and paper mills produced about \$21.1 million worth of output and employed about 1,242 persons.

The estimates of employment and output for 1969 (see Tables 13 and 19) show that in the sawmill industry, the employment required per \$1 million of product was about 93 (i.e. 2261 employees/\$24.2 million). In the pulp and paper industry in 1969, the employment per \$1 million of output amounted to about 26 (i.e. 2080 employees/\$78.6 million).

These figures can be misleading. First, the estimate of employment and output for the sawmill industry in 1960 is thought to be incorrect.²¹ Employment should be 128 persons per \$1 million of output rather than 86. If this were the case, the labor input per \$1 million of output for sawmills has dropped since 1960. Assuming prices per unit of output have remained unchanged, the lower labor input would indicate an increase in productivity. Price changes have taken place, however, and one would have to look at changes in dollar values over this period.

What is more important here, however, are the indirect effects of output on employment. In addition to the 86 persons directly employed per \$1 million of output in sawmills in 1960, 189 were indirectly employed bringing the total to 275 persons (Table 35). The ratio of total employment to direct was about 3.2 to 1. As mentioned earlier, this is the

²¹ There is a discrepancy between value of output by this sector (\$23.8 million) and employment (2,052) from the input-output tables, with the information reported in D.B.S. (1960) which lists value of products at about \$16.0 million and employment at 2,052. If this were the case, employment per \$1 million of output would be 128 rather than 86.

Table 35. Direct and indirect employment per \$1 million of output for selected industries in Nova Scotia, 1960

Industry	No. of employees			Ratio total/direct
	Direct	Indirect ^a	Total ^a	
Agriculture	46	124	170	3.7
Forestry	167	100	267	1.6
Coal mining	181	127	308	1.7
Poultry processing	46	143	189	4.1
Shellfish products	80	264	344	4.3
Feed manufacturing	22	68	90	4.1
Clothing	136	82	218	1.6
Sawmills, sash ^b	86	189	275	3.2
Misc. wood prods. ^c	337	135	472	1.4
Furniture	142	128	270	1.9
Pulp and paper	59	148	207	3.5
Paper products	68	102	170	2.5
Petroleum ref.	6	25	31	5.2
Electric power	54	140	194	3.6
Hotels & rest.	158	142	300	1.9

a. Indirect and total employment computed from the ratio and direct employment using Model III of the input-output tables.

b. Includes sawmills; sash, door, and planing mills; wooden box factories; and coffin and casket plants.

c. Includes wood preserving plants, wooden-ware firms (stepladders, tubs, etc.), and wood turning plants.

Source: D.B.S. Input-Output Tables for Nova Scotia, 1960.

employment multiplier - this means that for every person directly employed in sawmills in Nova Scotia in 1960, about two (2.2) persons were estimated to have been additionally employed in other occupations.

The pulp and paper industry is estimated to have employed about 59 persons per \$1 million of output in 1960. A further 148 were estimated to have been employed indirectly, resulting in a total of about 207. The ratio in this case would be about 3.5 or slightly higher than for sawmills.

Similar results for sawmills and pulp and paper mills might be expected. Indirect effects result from purchases from other sectors

(logging, labor, and so on). Since the major inputs of both sawmills and pulp and paper mills are wood and labor (wood is equal to about 50% of value of input and labor about 31% for sawmills; and wood accounted for about 28% and labor about 20% for pulp and paper mills), it would be expected that the employment effects would not differ markedly. For example, labor requirements for harvesting and transporting sawlogs would not be expected to differ substantially from those for pulpwood. Also, the spending patterns of sawmill workers would not be expected to result in significant differences on employment in other areas than would spending patterns of the people working in pulp and paper mills. It must be re-emphasized, however, that these ratios must be considered within the context of the assumptions and qualifications pertinent to the input-output tables. Since the tables were constructed for 1960,²² they are not necessarily indicative of the employment effects in 1969.

How do these ratios or multipliers compare with estimates for other areas? The D.B.S. input-output table for New Brunswick in 1960 shows that total employment in the sawmill industry²³ in New Brunswick was about 2,184 and in pulp and paper mills about 4,179. Direct employment per \$1 million of output for sawmills was about 70 and indirect was about 175 resulting in a ratio (total/direct) of about 3.5. Direct employment per \$1 million of pulp and paper output was calculated to be almost 39 and indirect was 164 making the ratio about 4.2. Thus for both sawmills and pulp and paper mills in 1960, the ratio of total employment to direct employment tended to be slightly higher in New Brunswick than in Nova Scotia.

A recent study done for the Ontario Department of Lands and Forests (1969) indicates that the employment multiplier in the forest industry as a whole is at least 2.75. That is, for every one job directly associated with the industry, there are about 1.75 additional jobs created indirectly. This report further states, "We are confident that the true total of indirect employment is substantially higher than we have estimated and that the provincial multiplier exceeds three".

²²Work on the 1965 tables is nearing completion.

²³Includes sash, door, and planing mills also.

There have been several other studies done in forestry and related sectors as well as for individual industries.²⁴ Most of this work, however, is of interest here only from the point of view of the methods of analysis.

2. *Indirect Impact on Salaries and Wages*

The direct salaries and wages paid by sawmills and pulp and paper mills in 1969 in Nova Scotia were estimated to be about \$8.1 million and \$16.0 million, respectively. As in the case of employment, information on indirect salaries and wages generated is available only for 1960. At that time, the direct salaries and wages paid per \$1000 of output for sawmills was about \$237 and for pulp and paper mills, about \$258 (Table 36). Indirect salaries and wages paid per \$1000 of output were estimated at \$545 for sawmills, resulting in salaries and wages multiplier of about 3.30. Thus for every \$1 paid out directly in salaries and wages in the sawmill industry in 1960, an additional \$2.30 is estimated to have been paid indirectly. The pulp and paper industry for 1960 had an estimated ratio of about 2.7.

Data for the two industries for 1969 indicate that direct salaries and wages paid per \$1000 of output amounted to about \$336 for sawmills (\$8,131,500/\$24,196) and \$203 for pulp and paper mills (\$15,965,000/\$78,561). These figures, therefore, indicate that for 1969, direct wages and salaries paid per \$1000 of output are higher for sawmills than pulp and paper mills.

Comparison of these figures with those given for 1960 shows that direct salaries and wages per \$1000 of output has gone up from \$237 to \$336 for sawmills and down from \$258 to \$203 for pulp and paper mills. This would appear to substantiate the indications regarding employment found on the previous page. Per unit value of output in sawmills, the number of persons directly employed had gone up; also, as indicated here, the direct salaries and wages paid has gone up. The reverse appears to have happened in the pulp and paper industry.

In summary, it must be re-emphasized that there is little up-to-date, comparable information on the indirect impact of sawmills and

²⁴ In forestry and related studies, see bibliography: Hughes (1970); Shallau *et al.* (1969); Kaiser (1969); Gamble (1968); Gamble and Raphael (1965); Westoby (1962). For studies of other industries see Isard and Kuenne (1953).

Table 36. Direct and indirect salaries and wages per \$1000 of output for selected industries in Nova Scotia, 1960

Industry	\$ per \$1000 output			Ratio total/direct	Household income multiplier
	Direct	Indirect ^a	Total ^a		
Agriculture	95	371	466	4.9	2.8
Forestry	455	273	728	1.6	1.6
Coal mining	682	409	1091	1.6	2.0
Poultry processing	91	400	491	5.4	8.6
Shellfish products	220	550	770	3.5	5.4
Feed manufacturing	61	214	275	4.5	2.9
Clothing	258	258	516	2.0	2.2
Sawmills, sash. ^b	237	545	782	3.3	3.9
Misc. wood prods. ^c	166	398	564	3.4	2.9
Furniture	333	400	733	2.2	2.4
Pulp and paper	258	439	697	2.7	3.2
Paper products	196	333	529	2.7	2.7
Petroleum ref.	40	84	124	3.1	1.9
Electric power	228	433	661	2.9	2.1
Hotels and rest.	286	429	715	2.5	2.3

a. Indirect and total salaries and wages computed from the ratio and direct salaries and wages using Model III of the input-output tables.

b. Includes sawmills, sash, door, and planing mills; wooden box factories; and coffin and casket plants.

c. Includes wood preserving plants, wooden-ware firms (stepladder, tubs, etc.), and wood turning plants.

Source: D.B.S. Input-Output Tables for Nova Scotia, 1960.

pulp and paper mills in Nova Scotia. Data for the two industries for 1960 indicate that for every person directly employed in sawmills about 2 persons were indirectly employed. In pulp and paper mills, the estimates show about the same effects. About the same relationship between the two industries was shown with regard to salaries and wages. For every \$1 paid out in salaries and wages in the sawmill industry for 1960, slightly over \$2 was estimated to have been paid indirectly. In the pulp and paper mills, the indirect effect was slightly less than \$2.

These ratios may or may not apply to the industries in 1969. There is good reason to believe that the difference in ratios between the two industries has become greater. If, for example, the relative labor input into sawmills had remained about the same since 1960, but the relative labor requirements in the sectors (e.g. logging) supplying sawmills declined, the ratio would go down, that is, the multiplier would decrease. It is quite likely that the relative labor input going into pulp and paper production directly has declined (increased automation). If this were the case, and if the relative labor inputs into sectors supplying pulp and paper mills has stayed the same or at least not decreased to the same extent, the ratio would become larger.

This information, however, must be looked at in the total context of goals and economic impact. In the next section, an attempt is made to bring together all the information discussed earlier.

V. SUMMARY AND CONCLUSIONS

In the previous sections, an attempt was made to identify and delineate that information necessary for a better understanding of the economic impact of sawmills and pulp and paper mills. Because of the difficulty of defining impact precisely, it was necessary to look at a multiplicity of factors including employment, salaries and wages paid, degree of product processing, product destination, and so on. In this section, we attempt to summarize these data and compare the effects or impact of sawmills with that of pulp and paper mills, and also to compare impact within the sawmilling industry.

A. ECONOMIC IMPACT OF SAWMILLS COMPARED WITH PULP AND PAPER MILLS

1. Summary of Inputs

In 1969, the sawmill industry in Nova Scotia used inputs valued at about \$25.8 million or about one-third the amount used by the pulp and paper industry (\$78.6 million). The value of fuel, electricity, materials, and supplies for sawmills was about \$15.2 million and for pulp and paper mills about \$39.4 million. Value added for sawmills was \$10.6 million and for pulp and paper mills about \$39.2 million (Table 37).

Fuel and electricity used by sawmills was estimated to be a little over \$1 million, and for pulp and paper mills was \$4 million. Inputs of materials and supplies, excluding wood and fuel, for sawmills was also slightly over \$1 million, however, inputs into pulp and paper mills amounted to about \$13.5 million.

A large percentage of these inputs for both industries were imported. However, in terms of proportion of total inputs, materials and supplies (excluding wood) amounted to only about 4% in the case of sawmills, and about 17% in the case of pulp and paper mills. A portion of the chemicals used by pulp and paper mills is expected to be provided from within Nova Scotia soon.

In the production of 240.3 million f.b.m. of lumber and other products, the sawmill industry used about 42.3 million ft³ of roundwood.²⁵

²⁵ The sawmill industry used about 240.3 million f.b.m. on the basis of product measure, that is, the industry produced this amount of lumber; however, the roundwood requirements per M.f.b.m. of lumber would be about 176 ft³ (N.S. Dep. Lands & Forests 1970).

Table 37. Comparative summary of the direct economic impact of sawmills and pulp and paper mills in Nova Scotia, 1969

Factor	Sawmills	Pulp and Paper Mills
Volume of wood used		
(Vol. of product) ^a	240,263.0	1,043.4
(Vol. of product - M.ft ³) ^b	19,941.8	88,693.1
(Vol. of roundwood - M.ft ³) ^b	42,286.3	88,693.1
No. of employees	2,261	2,080
Capital investment (\$ million)	9.9 ^c	180.0 ^d
Material inputs (\$'000)	15,236.6	39,373.0
Fuel and electricity	1,097.7	4,091.0
Material and supplies	1,045.9	13,529.0
Wood	13,093.0	21,753.0
Value added (\$'000)	10,560.1	39,198.0
Salaries and wages	8,131.5	15,965.0
Other	2,428.6	23,223.0
Total input (\$'000) (output)	25,796.7	78,561.0

a. Values in M.f.b.m. for sawmills, and M. cords for pulp and paper mills.

b. 1 M.f.b.m. of lumber is equal to about 83 ft³ of solid wood; also equal to about 176 ft³ of roundwood solid wood. One cord is assumed to equal 85 ft³ of solid wood.

c. Based on current market value.

d. Based on original capital plus repair expenditure.

Source: Industry survey, 1970.

The pulp and paper industry used about 88.7 million ft³ or slightly over twice the requirements of sawmills. The value of this wood amounted to about \$13.1 million or about 51% of the total value of inputs for sawmills, and about \$21.8 million or 28% of the total value of inputs for pulp and paper mills.

Total value added by sawmills was about \$10.5 million or about 41% of the value of inputs. Value added by the pulp and paper mills was almost \$39.2 million or about 50% of total inputs. Salaries and wages made up about 77% of value added for sawmills, but only about 41% of the value added for pulp and paper mills.

In 1969, sawmills employed 2,261 persons and pulp and paper mills about 2,080. Employment in sawmills was quite seasonal and fluctuated from a low of 1,577 in December to a high of 2,892 in June. In the pulp and paper industry, employment fluctuated between 1,499 in March and 1,630 in August (these figures are for employees in manufacturing operations only).

Although employment was slightly higher in sawmills (2,261) than in pulp and paper mills (2,080), the salaries and wages paid by sawmills (\$8.1 million) was only about half that paid by pulp and paper mills (\$16.0 million). This is verified by the average hourly earnings. The highest average wage paid in the sawmilling industry was about \$2.11 per hour, paid to sawyers, and the lowest average was \$1.37 per hour, paid to green chain workers or general labor. The estimated average wage for all workers engaged in manufacturing operations for pulp and paper mills was \$3.13 per hour.

Employment per unit of wood used in sawmills was more than twice that in pulp and paper mills (Table 38). Although the salaries and wages paid per unit of wood used was slightly higher in sawmills than pulp and paper mills, the difference is not significant. As might be expected, wood costs were relatively higher for sawmills than pulp and paper mills because of the higher average value of sawlog material.

Table 38. Estimated employment and inputs per 1 million ft³ of roundwood used^a by sawmills and pulp and paper mills in Nova Scotia, 1969

Factor	Sawmills	Pulp and paper mills
No. of employees	53	23
Material inputs (\$'000)		
Fuel & electricity	26	46
Materials & supplies	25	153
Wood	310	245
Value added (\$'000)		
Salaries & wages	192	180
Other	57	262
Total input (\$'000)	610	886

a. See Table 37 for roundwood used.

Source: Industry survey, 1970.

The significant differences in value inputs per unit of wood used are materials and supplies (excluding wood), and the "other" category of value added. The value of materials and supplies for pulp and paper was about six times that for sawmills. If, however, the import content were taken out of this, the difference would not be great. The "other" category of value added includes taxes, profit, depreciation, and so on.

In terms of value of input per unit of wood used, the differences between sawmills and pulp and paper mills are not significant. There is definitely a higher relative input of labor in sawmills in terms of number employed.

2. Summary of Output

The value of output of sawmills was estimated to be about \$24.2 million. This is obviously less than the estimated value of inputs, but the difference is not important since all figures are estimates made on the basis of averages for the sample mills. If the delivered value of lumber were used rather than the value f.o.b. mill, the value of sawmill outputs would be about \$2 million higher.

Analysis of lumber processing and distribution showed that only about half the softwood lumber sold was planed and most of it was sold green or only partially air-dried. About 30% of the lumber was shipped outside Nova Scotia.

The value of pulp and paper output was estimated at \$78.6 million. This included newsprint, unbleached groundwood pulp, bleached sulphite pulp, groundwood pulp and paperboard, kraft pulp, and hardboard. Only about 3% of the value of output of pulp and paper mills in Nova Scotia is estimated to have been distributed within the province.

3. Indirect Impact

Analysis of the data from the specially tabulated input-output tables indicated that in terms of employment and income the differences between sawmills and pulp and paper mills were probably not too significant. In both industries, data for 1960 showed that for every one person employed directly, about two persons were employed indirectly. Also, for every \$1 paid out directly for salaries and wages, about \$2 was estimated to be paid out indirectly.

Although the pulp and paper industry required about three times the value of inputs and employed about the same number of people as the sawmilling industry, the manufacturing operations were confined mainly to the six geographical areas - the locations of the mills. There is little doubt that the respective communities are heavily dependent on these mills.

The 316 sawmills in operation in 1969, were scattered throughout the province. It is not known how many communities were directly dependent on these mills, but it is probably safe to assume that several of the sawmills and boxwood mills producing over 1,000 M.f.b.m. located outside the larger cities and towns, provided the main source of work.

To determine this more specifically, however, the proportion of the local labor force employed in the mill, other occupations, and so on would have to be identified. A community dependence index or average for all sawmills would not be very meaningful.

The sawmill employee survey indicated that on the average, employees earned about three-quarters of their income from mill employment. Workers were found to have a relatively high average age, to have spent a considerable number of years in mill work, and to have limited alternate occupations. Because of these factors, it is felt that the majority of these people are heavily dependent on the mills. As was stated earlier, if a mill were to close down, it is not likely that the employees would move to another geographic location; in many cases, if they did so, it would only be to similar kinds of work.

Although no comparable survey was done for employees in pulp and paper mills, it is felt that these workers would tend to be somewhat more mobile. The average age of pulp and paper mill workers would not be expected to be as high as that for sawmill workers. Also, it is probably safe to assume that the average time spent within the pulp and paper mills was not as long as that spent by employees in sawmills.

B. ECONOMIC IMPACT BY SAWMILL SIZE CLASS

Analysis of investment and value of inputs and output by sawmill size class has shown that while there were substantial differences in absolute values by size class, there were few differences in these factors per unit of production. In other words, while the total value of inputs

and outputs by size class varied, most of the variation was because of differences in total production rather than differences per unit of production.

Average capital investment per mill varied from about \$5,000 for mills in the smallest size (≤ 100 M.f.b.m.) to about \$358,000 per mill for those in the largest class (≥ 6001 M.f.b.m.). Average value of inputs per mill varied from about \$1.4 million for the mills in the largest class to \$8 thousand for mills in the smallest class.

Probably the most significant factor showing the difference in impact of various sawmill size classes was period of operation and employment. Data on operating period show that mills in the three largest size classes ($>2,000$ M.f.b.m.) operated year-round. Mills in the size classes from 101 - 2000 M.f.b.m. operated about 7 to 9 months, and mills in the smallest class averaged only about 4 months operation.

Average number employed per mill on a year-round basis varied from 2 for mills in the smallest class to 71 for mills in the largest class. The average for all mills was 7. Average annual salaries and wages paid also differed substantially for the various size classes, from about \$5,000 per employee (mills ≥ 6001 M.f.b.m.) to \$2,448 per employee (mills ≤ 100 M.f.b.m.).

Value of output varied from \$1.5 million for mills in the largest class to \$6.4 thousand for mills in the smallest size class. Chips made up a substantial percentage of the value of output for mills producing greater than 2001 M.f.b.m. of lumber. Mills producing less than 1000 M.f.b.m. produced no chips, but relied on the production of products such as laths, ties, and box shooks for a portion of their income.

Smaller mills planed a smaller percentage of their lumber and relied more heavily on the local market for sales than did larger mills.

In summary, the most significant difference among the various sawmill size groups in terms of economic impact is the period of operation and the stability of employment. Smaller mills, that is mills producing <2001 M.f.b.m., did not provide year-round employment.

VI. REFERENCES

- A.D.B. 1968. Forestry in the Atlantic Provinces. Background Study No. 1. Atlantic Development Board, Ottawa.
- Anon. 1963. Pulp and products segment committee submission to forest sector. Voluntary Economic Planning, Halifax, Oct. 1963.
- Comeau, R. L. 1969. A study of the impact of the area development agency program in Nova Scotia. Area Dev. Agency, Dep. Reg. Econ. Expansion, Ottawa.
- D.B.S. 1960. Sawmills. Can. Bur. Statist., Cat. No. 35-204.
- D.B.S. 1969a. Pulp and paper mills. Can. Bur. Statist., Cat. No. 36-204.
- D.B.S. 1969b. Sawmills and planing mills. Can. Bur. Statist., Cat. No. 35-204-P.
- D.B.S. 1970. Standard industrial classification manual. Can. Bur. Statist., Cat. No. 12-501, Occasional.
- Donaldson, J. S. 1961. The pulp industry in Nova Scotia. A paper presented to N.S. Inst. Agrol., Kentville, N.S., 15 Feb. 1961.
- Gamble, H. B. 1968. The regional economic role of forest products industries. J. Forest. 66:462-466.
- Gamble, H. B. and D. L. Raphael. 1965. A microregional analysis of Clinton County, Pennsylvania (2 vols.). Penn. Reg. Anal. Group, Penn. State Univ., Penn.
- Hughes, J. M. 1970. Forestry in Itasca County's economy: An input-output analysis. Univ. of Minn., Agr. Exp. Sta., Forest Ser. 4, Misc. Rep. 95.
- Isard, W. and R. E. Keunne. 1953. The impact of steel upon the greater New York-Philadelphia industrial region. Rev. Econ. & Statist., 35:289-301.
- Isard, W. and S. Czamanski. 1965. Techniques for estimating local and regional multiplier effects of changes in the level of major governmental programs. Peace Res. Soc.: Papers III, Chicago, 19-45.
- Kaiser, H. F., Jr. 1968. Interindustry model of the U.S. forest products economy. Forest Prod. J. 18 (11): 15-18.
- Kaiser, H. F., Jr. 1969. Input-output analysis of the southern forest economy, 1963. U.S. Dep. Agr., Forest Serv., S. Forest. Exp. Sta., Res. Paper SO-43.

- Larsen, H. K. 1969. A study of the economic impact generated by ADA-assisted manufacturing plants located in the Province of New Brunswick. Area Dev. Agency, Dep. Reg. Econ. Expansion, Ottawa.
- Levitt, K. 1969. A macro economic analysis of the structure of the economy of the Atlantic Provinces. 1960. Pap. presented at the Can. Econ. Ass., York Univ., 6 June 1969.
- M.L.B. 1969. Distribution of sawn lumber (1964-1969), Nova Scotia and New Brunswick. Maritime Lumber Bureau.
- N. S. Dep. Lands & Forests. 1970. Producers and production of forest products - 1969. N.S. Dep. Lands & Forests, Ext. Note 65.
- N. S. Vol. Planning Board. 1966. Plan for the forest sector. N.S. Voluntary Planning Board, Halifax.
- Ont. Dep. Lands & Forests. 1969. The Ontario forest industry, its direct and indirect contributions to the economy. Ont. Dep. Lands & Forests, Toronto.
- Shallau, C., W. Maki and J. Beuter. 1969. Economic impact projections for alternative levels of timber production in the douglas-fir region. Ann. Ass. Reg. Sci. 111(1).
- Smith, G. I. 1963. Address to the Voluntary Economic Planning Conference, Forestry Sector, Truro, N.S., 16 April 1963.
- Tiebout, C. M. 1962. The community economic base study. Suppl. Pap. 16, Comm. for Econ. Dev., N.Y.
- Westoby, J. C. 1962. Forest industries in the attack on economic development. Unasylva, 16: 168-201.

VII. APPENDICES

	Page
1. Sawmill industry questionnaire	81
2. Sawmill employee questionnaire	89
3. Pulp and paper industry questionnaire.	90
4. Formulae used for estimating totals and variances for population parameters	94

Appendix 1. Sawmill Industry Questionnaire*

CONFIDENTIAL

Mill No.: _____ County: _____

Nearest town, village, city: _____

Interviewer: _____ Date: _____

Position of Person Interviewed: _____

I. GENERAL CLASSIFICATION

A. Production 1969: Lumber (M.f.b.m.)
Chips (specify units)

B. Months operated in 1969 (circle)

J F M A M J J A S O N D

C. Number of employees (usual)

D. Type of mill (Check)

1. Stationary	Portable
a. Band	
b. Circular	
c. Other	

2. Softwood	Hardwood	Both
-------------	----------	------

3. Stud mill	Long log	Both
--------------	----------	------

4. Planing mill	Chipper	Debarker
-----------------	---------	----------

E. Type of ownership (check)

1. Individual

2. Partnership

3. Incorporated	Branch	Subsidiary
-----------------	--------	------------

4. Other (e.g. Cooperative)

If branch plant or subsidiary, please comment:

*These questionnaires have been modified to show only the questions asked but do not allow space for answers.

II. MAJOR NON-LABOR INPUTS

Item	Total cost at plant, \$	Purchase source, % from --			
		N.S. (if known, specify where produced)	Other Atlantic Provinces	Rest of Canada	Other

A. Fuel & Electricity

Gasoline
Fuel oil
Electricity
Lubrication
Other (specify)

B. Materials & Supplies (excluding wood)

Machinery & equipment
Wire products (steel
strapping hardware)
Anti-stain dip
Office supplies
Other (specify)

C. Services

Transportation (other
than logging)
Insurance, equipment
rental
Building rental
Railroad siding rental
Marketing & advertising
Telephone, interest,
bank charges, etc.
Other (specify)

Quantity	Cost at mill \$/unit
----------	-------------------------

D. Wood input

1. Roundwood (M.f.b.m.)
 - a. Softwood
 - b. Hardwood
2. Semi-processed wood (M.f.b.m.)
 - a. Cants, rough lumber, etc. for
resaw, planing, etc.
 1. Softwood
 2. Hardwood

- D. 2. b. Slabs, edgings, etc. for
chipping (cords)
1. Softwood
 2. Hardwood

	Spruce & fir	Hemlock	Pine	Hardwood
--	--------------	---------	------	----------

3. Average top diameter (inches inside bark)
 - a. All logs
 - b. Long logs
 - c. Stud material

	% of roundwood input volume
--	--------------------------------

4. Source of roundwood input
 - a. Own logging operations
 - b. Contract logging
 - c. Purchase logs
 1. Roadside
 2. Delivered
 3. Other

	% of volume	Acres of forest land	% with harvestable sawlogs (within hauling distance)
--	----------------	-------------------------	---

5. Source of logs, if known
 - a. Mill's freehold
 - b. Crown land stumpage
 - c. Pulp Co., Crown lease
 - d. Pulp Co., freehold
 - e. Other large freehold
(over 1000 acres)
 - f. Small freehold
(under 1000 acres)
 - g. Other

	X	X
	X	X
	X	X
	X	X
	X	X
	X	X

6. Average hauling distance (one way, miles)

7. Estimated, or actual, costs (\$/M.f.b.m.)
 - a. Felling, bucking, skidding
 - b. Loading, hauling, unloading

- E. Volume of logs custom sawn (M.f.b.m.)

1. Cost of custom sawing (\$/M.f.b.m.)
2. Cost of logs at mill, if known (\$/M.f.b.m.)

III. EMPLOYMENT AND WAGES

A. Average number of employees by months

J F M A M J J A S O N D

B. Number of employees by location (usual)

- | | | |
|----------------|--------------------|-----------------|
| 1. Log yard | 2. Mill floor | 3. Green chain |
| 4. Lumber yard | 5. Other (specify) | 6. Planing mill |

C. What straight time wage rate (\$/hour) did you pay.

- | | | |
|-------------------|----------------|---------------------|
| 1. Sawyer | 2. Filer | 3. Grader or scaler |
| 4. Edger, trimmer | 5. Green chain | 6. Other (specify) |

D. Total annual payroll, salaries & wages paid (\$)

E. What percentage of your employees have been working for you --

1. Less than 1 year
2. 1 to 5 years
3. Over 5 years

F. Are your employees unionized?

G. Can you find suitably trained and experienced men for your mill?
If "No", in what categories?

H. Estimated percentage of employees from nearest city, town, or village

IV. TAXES

A. Income taxes paid by mill, Federal & Provincial (\$)

B. Local & Municipal taxes excluding tax on forest land (\$)

C. Taxes on forest land (\$)

D. Vehicle registration (\$)

E. Workman's compensation (\$)

V. OUTPUT A. Production: Volume and value of production

Major products	Quantity	Total value at mill, \$	Finishing		Seasoning		
			Rough %	Planed %	Green or P.A.D. %	A.D. %	K.D. %
1. Lumber							
a. Softwoods (M.f.b.m.)							
b. Hardwoods (M.f.b.m.)							
2. Railway ties (M.f.b.m.)							
3. Other products							
a. Box shooks (M.f.b.m.)							
b. Laths (M's)							
c. Mine timbers (M.f.b.m.)							
d. Pulp chips (specify units)							
e. Other (specify, poles, pilings, etc., and units)							

VI. CAPITAL INVESTMENT

- A. Estimated value (\$) of --
 - 1. Buildings, storage facilities, etc.
 - 2. Mill machinery & equipment
 - 3. Land value (excluding forest land)
 - 4. Motor vehicles
 - 5. Logging equipment (if applicable)
- B. Primary source of investment capital (%)
 - 1. Nova Scotia
 - 2. Rest of Canada
 - 3. U.S.
 - 4. Other (specify)
- C. Total annual capacity of mill (Year round, as opposed to 1969 production, specify number of shifts) (M.f.b.m.)
- D. Have there been any recent capital expenditures, equipment, buildings, etc.? (Specify by Year, Type, and Amount)
- E. Is capital availability a problem?
If "Yes" in what area?
 - 1. Plant modernization or expansion
 - 2. External (sidings, roads, wharves)
 - 3. Timberland acquisition
 - 4. Day-to-day operating expenses
 - 5. Other (specify)
- F. Has this mill received any financial assistance from any government source? If "Yes", specify by Year, Purpose, Amount, and Type of Government and agency.
- G. What are your plans for expansion?

Appendix 2. Sawmill Employee Questionnaire

CONFIDENTIAL

Mill No. _____

Please do not put your name on the questionnaire.

1. Age Sex M F No. of dependents
2. Years of school completed:
Special skills, training, and licences held:
3. What is your main job in the mill?
4. Number of years employed in this mill:
5. Number of months employed in 1969(); 1968(); 1967().
6. Percentage of income earned from mill employment:
7. If you are laid-off from this mill, for part of the year, are
you able to find suitable work?
Yes No Not applicable.

If "Yes", what type of work?
8. How far do you drive to work, one way (miles)?

Appendix 3. Pulp and Paper Industry Questionnaire

CONFIDENTIAL

Mill No. _____ Date _____

Position of person completing questionnaire _____

I. INPUTS*

	Quantity	Total cost at mill, \$	% purchased within N.S.
A. Purchased fuel & electricity			X
B. Wood used			
1. Roundwood (own production)			
a. Softwood			
b. Hardwood			
2. Roundwood (purchased)			
a. Softwood			
b. Hardwood			
3. Wood residue			
a. Pulp chips			
b. All other			
4. Wood pulp			
C. Other paper stock			
D. Paper & paperboard			
E. Chemicals			X
F. Containers & other shipping and packing materials			X
G. Operating, maintenance, & repair supplies (not fuel)			X
H. Amount paid to other establishments for work on materials owned by this establishment			X
I. Non-manufactured (office supplies, etc.)			
J. Other (specify) _____			X

*Inputs should be those used, inventory changes should be accounted for.
Answers refer to calendar year 1969.

II. OUTPUTS

Total value at mill, \$	% of sales to N.S.
-------------------------------	--------------------------

- A. Manufactured (specify)
 B. Non-manufactured (specify)
-

III. LABOR

Salaries, wages, etc.	Average no. employed	Total hours paid
--------------------------	-------------------------	---------------------

- A. Administrative, sales, etc.
 B. Production & related
-

- C. Monthly breakdown of numbers employed in manufacturing operations
- | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
-

Pulp and Paper Companies: Supplementary Questionnaire

Mill No. _____ Date _____

Position of person completing questionnaire _____

I. INPUTS

Total cost at mill, \$	Estimated % within N.S.
---------------------------	----------------------------

I. Business Expenses & Services

1. Transportation bought (exclude logging)
 2. Printing
 3. Radio, telephone, telegraph, postage
 4. Travel & entertainment
 5. Finance, insurance, & real estate charges
 6. Personal services (donations, association dues, etc.)
 7. Business services
 - a. legal
 - b. audit
 - c. advertising
-
8. Taxes (\$)
 - a. Federal & Provincial income taxes
 - b. Municipal taxes (excluding taxes on forest land)
 - c. Taxes on forest land
 9. Workman's compensation, unemployment insurance, etc. (\$)
 10. Profits (\$)
 11. Rent & interest (\$)
 12. Depreciation (\$)

V. CAPITAL INVESTMENT (1969)

- A. Estimated capital investment (depreciated value, if otherwise please specify) in buildings, storage facilities, mill machinery and equipment, land (excluding forest land), vehicles, etc. (\$).

- B. Logging equipment, if applicable (\$)
- C. Freehold forest land area (acres)
- D. Crown land leased (acres)

VI. EXPANSION

- A. What are your plans for expansion? Please comment.

Appendix 4. Formulae Used For Estimating Totals and Variances for Population Parameters

Example: Estimate of Softwood Lumber Production by Class

1. Production by mill size class:

$$x_h = N_h \bar{x}_h$$

where: x_h = total lumber production for the hth class

N_h = total # of mills in the hth class for the population

\bar{x}_h = mean production by class (x_h/n_h)

2. Variance of the estimated total by size class:

$$\sigma_{xh}^2 = N_h^2 (1 - f_h) \frac{S_h^2}{n_h}$$

where: σ_{xh}^2 = variance of the estimated total by size class

N_h^2 = square of the number of mills in the hth class

f_h = sampling fraction in the hth stratum

S_h^2 = s_h^2 = variance of class (for sample)

n_h = number of mills in the sample of the hth class.