Professional Articles

Labour Productivity and Cost Trends in Canadian Forest Industries

by

J. Dobie¹

Introduction

Improvements in labour productivity cannot be attributed solely to labour but are normally a function of improvements in technology through capital investment, improvements in capacity utilization, improvements in managerial skills and organizational techniques, allied to changes in the skill and efforts of the labour force. If the above factors of production combine to increase labour productivity at a rate greater than labour compensation, then labour costs per unit of output will diminish. Consequently the margin between unit output price and cost increases, providing the opportunity for increased returns to the factors of production, or improved competitive position, or both.

Given the recent emphasis on improving productivity in Canadian industry it is of some interest to examine how it is measured, what recent trends in labour productivity and labour costs in Canadian forest industries have been, and what changes have taken place in the distribution of returns to the factors of production.

Productivity Measures

The measures of productivity used by Statistics Canada in the System of National Accounts, and most often quoted by the media, are Gross Domestic Product (GDP) at factor cost in constant prices per employee or employee-hour worked (Statistics Canada Cat. No. 14-201 Ann. "Aggregate Productivity Measures").

Gross Domestic Product at factor cost (Cat. No. 61-213 Ann.) represents the return to the factors of production mentioned above. By using constant prices (1971 base at present) the effect of price changes is removed from output values, and any output index subsequently developed is a quantity or real output index. By relating GDP in constant prices to labour input, productivity indexes thus developed are quantity or real output indexes. Further, by relating changes in labour productivity to changes in labour compensation, an index of labour cost per unit of output can be developed.

Indexes

Statistics Canada at present publishes only aggregate industrial productivity measures. Using similar procedures, however, indexes can be developed for individual industries. This is done here for the logging industry (Standard Industrial Classification (SIC) 041, 1980), the sawmill and shingle mill

industry (SIC 251), the veneer and plywood industry (SIC 252), and the pulp and paper industry (SIC 271).

The productivity and cost indexes presented here are based on hours paid rather than hours worked because the former data are readily available in each industry. Further, because the indexes based on hours paid and persons employed were almost identical only the former are presented here.

In productivity measures published by Statistics Canada, the GDP for the logging industry is included with that for forestry activities and published as the GDP for forestry. Since hours paid associated with the GDP are not available, the approach taken here is to use logging value-added and associated hours paid as a surrogate productivity index.

The use of hours paid rather than worked for the four industries covered, and the use of value-added rather than GDP for the logging industry, will result in indexes which are little, if any, different from the traditional Statistics Canada productivity and cost indexes.

In the accompanying tables three indexes are presented for each of the industry groupings. The productivity index is equivalent to trends in physical output per employee-hour paid. The two cost indexes represent trends in unit output labour costs, one in current dollars and the other in constant dollars.

Trends

Productivity. Physical productivity increased over the period from 1971 to 1982 in all four industry groups, as shown in Table 1. The pattern of change is different in each industry for various reasons, but there were marked increases in productivity over the four or five years prior to 1982 for both the logging and sawmilling industries, less so for the veneer and plywood industry, and the pulp and paper industry actually showed diminishing productivity over that period.

The large increases in productivity in logging and sawmilling were caused by fairly large reductions in employment which were accompanied by smaller reductions in employee output. For example in logging in 1982, employee-hours paid were only 65% of the 1979 total, but output dropped by only 21 points to 79% of 1979 output. Similarly in sawmilling, hours paid in 1982 were 70% of the 1979 total but output was 87% of the 1979 output. In other words the residual employed labour was working more efficiently.

In the veneer and plywood industry a 35% reduction in employment from 1979 to 1982 occasioned a 32% reduction in output, and in pulp and paper a 7% employment drop was accompanied by a 9% reduction in output. Thus reductions in employment in the two latter industries did not result in the

¹Statistics Canada Vancouver, BC.

increased labour efficiency exhibited in both the logging and sawmilling industries from 1979 to 1982.

Table 1. Canadian forest industries: Labour productivity trends 1971-1982 (1971 = 100.0).

Year	Logging	Sawmills and Shingle Mills	Veneer and Plywood Mills	Pulp and Paper Mills
1971	100.0	100.0	100.0	100.0
1972	106.2	93.9	97.7	104.0
1973	99.7	98.8	100.0	110.3
1974	98.9	104.7	97.3	108.1
1975	92.0	103.5	101.3	96.1
1976	113.5	123.4	112.5	97.2
1977	113.4	125.8	111.0	103.0
1978	109.6	118.9	112.3	114.6
1979	100.8	122.8	114.3	113.2
1980	112.1	124.4	118.7	115.8
1981	119.7	131.9	125.0	112.8
1982	122.5	151.2	120.8	111.0

Current Dollar Costs Current dollar cost trends per unit of output are shown in Table 2. These are a function of trends in labour productivity and labour compensation. If the latter is proportionately greater than the former then unit output labour costs will increase. This has obviously been the case over the period shown, where in 1982 unit output costs ranged from about 2.4 to 2.9 times those of 1971 for the four industry groupings.

Table 2. Canadian forest industries: Unit output labour cost trends 1971-1982 in current dollars (1971 = 100.0).

Year	Logging	Sawmills and Shingle Mills	Veneer and Plywood Mills	Pulp and Paper Mills
1971	100.0	100.0	100.0	100.0
1972	103.7	117.1	111.7	103.9
1973	126.2	125.4	121.1	106.3
1974	145.0	137.4	142.8	124.3
1975	169.1	160.8	160.5	160.4
1976	173.2	157.1	164.5	182.4
1977	190.0	174.2	184.4	194.4
1978	208.2	197.0	197.1	188.5
1979	246.8	212.0	212.1	205.7
1980	245.2	233.4	226.1	222.9
1981	260.3	242.8	244.5	254.5
1982	269.6	237.3	283.9	287.1

Constant Dollar Costs Constant dollar cost trends are a function of labour productivity and labour compensation in base year purchasing power, 1971 in this case. These are shown in Table 3 and are notable for the large decrease in the logging and sawmilling industries over the four or five years preceding 1982, coincident naturally with the increases in labour productivity in those industries over that period.

Unit output real labour costs in logging in 1982 were only 3% more than in 1971, down from a high of 29% more in 1979. In sawmilling, real costs in 1982 were 10% less than those in 1971, compared with highs of 16% more in 1978.

In all industries, real unit output labour costs in 1982 exhibited reductions from those in the mid-to-late-seventies, a trend which if continued should contribute favourably to our competitive position internationally.

Table 3. Canadian forest industries: Unit output labour cost trends 1971-1982 in 1971 constant dollars.

Year	Logging	Sawmills and Shingle Mills	Veneer and Plywood Mills	Pulp and Paper Mills
1971	100.0	100.0	100.0	100.0
1972	99.1	112.0	106.6	99.1
1973	111.9	111.3	107.3	94.4
1974	116.0	110.0	114.2	99.6
1975	121.8	115.9	115.7	115.7
1976	116.1	105.6	110.5	122.5
1977	118.1	108.2	114.6	120.8
1978	118.8	112.4	112.5	107.5
1979	129.2	110.8	111.0	107.6
1980	116.4	110.9	107.4	105.8
1981	109.9	102.5	103.1	107.5
1982	102.7	90.4	108.2	109.3

Other Industries It is of some interest to compare the forest industry trends with those of other industries in Canada to ascertain the relative performance in the forestry sector. This is done in Table 4 which shows productivity and cost indexes for 1982 for a variety of industry combinations. Sawmilling and agriculture had by far the best productivity increases over the period from 1971 to 1982, but veneer and plywood mills and pulp and paper mills were below the average for all manufacturing.

Table 4. Comparative productivity and cost indexes for Canadian industries 1982 (1971 = 100.0).

Industry	Productivity Index	Labour Compensation Index	Unit Output Labour Cost Index (\$ Current)
All commercial	117.2	315.0	268.8
Commercial goods-producing	122.9	344.5	280.4
Commercial service-producing	112.2	294.2	262.1
Agriculture	145.4	428.0	294.3
Manufacturing	123.7	335.8	271.6
Logging	122.5	330.3	269.6
Sawmills and Shingle mills	151.2	358.8	237.3
Veneer and Plywood mills	120.8	343.3	283.9
Pulp and Paper mills	111.0	318.7	287.1

Because of the large increase in unit labour compensation in agriculture over the period, unit output labour cost increases were the greatest of those shown despite the high productivity increases in agriculture. Sawmilling also had above average increases in labour compensation, but productivity increases were sufficient to render unit output labour cost increases the lowest of those shown in Table 4.

Both veneer and plywood and pulp and paper had unit output cost increases which were above the average of all commercial, commercial goods-producing, commercial service-producing, and manufacturing industries, whereas the logging by comparison performed fairly well.

Distribution of GDP. Finally it is also of interest to look at trends in the distribution of GDP between production labour and all other factors of production.

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Table 5. Share of GDP to production labour 1971-1982 for the Canadian forest industries.

Year	Logging	Sawmills and Shingle Mills	Veneer and Plywood Mills	Pulp and Paper Mills
Proportion of GDP to Labour				
1971	.552	.671	.659	.464
1972	.517	.751	.702	.460
1973	.584	.747	.707	.438
1974	.606	.738	.752	.462
1975	.636	.778	.762	.537
1976	.606	.708	.728	.568
1977	.617	.725	.755	.560
1978	.621	.754	.741	.498
1979	.675	.743	.732	.499
1980	.608	.743	.708	.491
1981	.574	.687	.680	.499
1982	.536	.606	.713	.507
Arithmetic Average	.592	.721	.720	.499

In both logging and sawmilling the share of GDP to labour dropped by 14% points from 1979 to 1982, and in the last two years shown was below the average for the period in both industries. These trends are consistent with productivity increases over that period in those industries, whereas the changes in labour share for the veneer and plywood and pulp and paper industries reflect their relatively less significant changes in productivity.

The magnitude of the averages for each industry indicates the relative labour-intensity of each industry, and indicates the proportion of GDP remaining for management, capital expenditures, taxation, debt payments and profits.

POSTDOCTORAL FELLOWSHIP

The School of Forestry at Lakehead University has a position for a postdoctoral fellow in the School's program of research in the genecology of tamarack in northwestern Ontario. The position requires training in quantitative genetics, biochemical genetics or plant physiology and will involve some teaching as well as research. The candidate must be qualified to receive an NSERC postdoctoral forestry fellowship for the 1985-86 school year and must be a Canadian citizen or landed immigrant. Candidate should send curriculum vitae and the names of three referees to: Dr. R.E. Farmer, Jr., School of Forestry, Lakehead University, Thunder Bay, Ontario. P7B 5E1.

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