THE PROCESS OF MECHANIZATION IN THE FOREST INDUSTRY OF NEWFOUNDLAND

An Analysis of Technological Change and Worker Resistance to Change

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BY


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ABSTRACT

This study attempts to outline the process and product of technological change in the forest industry of Newfoundland. The material is presented in three parts; the first deals with the traditional logging system, the second traces the process of mechanization, and the third examines the overall mechanized logging system.

The section dealing with the traditional logging system traces the origins of logging during the sawmilling era of the late nineteenth century and the subsequent development of large international paper companies during the first half of the twentieth century. It includes a statistical breakdown of those workers who depended solely on logging as a source of cash income, as well as an examination of those who participated in logging through occupational pluralism. A review of the physical technology, the work group activity, the organization, and the logging phases are also included.

The second portion traces the process of mechanization and presents an itemized account of the different technological innovations, the period when each was introduced, by whom, and why. A typology of technological change and worker resistance to change is also developed.

The final section examines each item in the mechanization chain from the point of view of the individual logger and attempts to determine which items he found acceptable and why. A statistical breakdown of the number of loggers replaced by new technology is included. The place of unionism in the overall mechanization process is also examined.

The most important findings of this thesis are

(1) Approximately sixty percent of the loggers employed in the traditional logging system had other sources of cash income available to them and used logging as a supplement to their primary income from these sources.

(2) The bulk of the workers who used logging as the primary or sole source of cash income lived in communities with no other resources available to them. These workers, through a variation in situs, were employed as loggers almost all year around and provided the nucleus of expertise around which the paper companies developed an efficient and extremely elastic organization.

(3) The first items of physical technology in the chain of items that eventually produced the mechanized logging system were introduced either by the workers themselves or by a combination of workers and paper companies.

(4) Each change in physical technology became a cause for still further changes as each new item created demands that the traditional system could not satisfy.

(5) From the individual loggers point of view short range considerations prevailed. Changes that were initially beneficial to the loggers were readily accpeted although some produced questionable results in long run terms. Conversely, those items of physical technology that had an initial negative effect on the work group were rejected or resisted.

(6) The costs of mechanization, in terms of loss of jobs, were borne most heavily by the occupational pluralists.

(7) The total number of jobs eliminated by mechanization represent about seventy-five percent of those employed at the peak of the traditional logging system and number approximately twelve thousand. The majority of these workers were occupational pluralists, usually inshore fishermen, who went into the forests during the fall or winter.

(8) Labour unions have been ineffective in protecting workers from loss of jobs.

(9) The union hiring clause and, more recently, the seniority clause were contributing factors towards the uneven costs of mechanization borne by the occupational pluralists.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

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J. P. Curran.

LIST OF TABLES

LIST OF GRAPHS

LIST OF DIAGRAMS

CHAPTER I

INTRODUCTION

On any given day when the Newfoundland House of Assembly is in session a visitor to the public galleries is likely to be entertained by lofty rhetoric extolling the virtues of the inshore fisherman and a minute cataloguing of the industries' problems or presumed problems. On any given day perusal of either of the two daily St. John's newspapers[1] is likely to reveal articles and editorial comment on the inshore fishery. However, it is a rare day indeed when either the politicians or the mass media turn their attention to the logging industry or the individual logger.

Richard Gwyn, Premier Smallwood's biographer, points out that there is only one logger's folksong that has gained island wide acceptance and the opening stanza[2]

> There is one bunch of men in this country
> That never is mentioned in song

laments this fact. The second stanza

> Now since their trade is advancing
> They'll come out on top before long

predicts change in the future. It is now over thirty years since that song was written and, except for a brief flurry of interest in 1959

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[1] The Daily News and The Evening Telegram

[2] Richard Gwyn, Smallwood The Unlikely Revolutionary (Toronto/Montreal: McLelland and Stewart Ltd., 1968), p. 200.

during a strike when the loggers found themselves facing the combined strength of the paper companies, the government, the churches, and practically every other labour group in the province, the industry and the loggers have remained virtually ignored.

The neglect of the forest industry has not been limited to politicians, editorial writers or local folklore. The Newfoundland section of The Memorial University Library holds only one Thesis dealing wholly with this subject[3]. Of the nine studies thus far published by The Institute of Social and Economic Research of Memorial University, only one deals directly with logging and then, only as part of a larger study including loggers, fishermen and miners[4].

If publicity is taken as an indicator one would expect that the logging industry has been of little importance to the overall economy of the Province. Quite the contrary. For over half a century it has been the basis of almost the entire economy of the interior of the Island. Among the three basic resource based industries fishing, mining, and forestry the latter ranked first in terms of percentage of

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[3]Robert D. Peters, "The Social and Economic Effects of the Transition from a System of Woods Camps to a System of Commuting in the Newfoundland Pulpwood Industry" (unpublished Master's Thesis, Memorial University Library, Memorial University of Newfoundland, 1965).

[4]Tom Philbrook, Fisherman, Logger, Merchant, Miner; Social Change and Industrialism in Three Newfoundland Communities, Newfoundland Social and Economic Studies No. 1 (St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland, 1966).

gross domestic product well into the mid 1950's.[5] As well, next to the fishery, it has been the largest employer in insular Newfoundland, employing at its peak over sixteen thousand full and part time workers in the logging section alone.[6]

The long standing neglect of the forest industry combined with the dominant position it has held in the Provincial economy are two of the reasons that it has been chosen as an area of study at this time. As well, the writer has had a long standing interest in insular Newfoundland and has been familiar with logging operations for over fifteen years, which pre-dates the period of rapid technological change.

The Problem Area

The area of study is the logging industry from its inception in the late 19th century to the present day, and, while this great time span means that the study will be wide ranging, it is also intended that it include the more common localized or refined problem area usually found in studies at this level. The refined problem is based on the most dramatic changes that have occurred in logging during the last half century and that is the technological revolution that has taken place in the past fifteen years.

Sociologists have garnered a considerable literature on the effects that technological changes have on the recipient culture,

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[5]Parzival Copes, St. John's and Newfoundland, An Economic Survey (St. John's: Guardian, Limited, 1961), p. 80.

[6]Calculated from data presented in Chapter II.

organization, and individuals[7]. In fact perusal of most of this literature leaves one with the feeling that perhaps, given the factors seemingly operating against it, change of any kind is unlikely. This conclusion follows from the fact that most of these studies are based on the introduction of one particular item and, since the studies are problem oriented, they tend to focus directly on cases where difficulties have been encountered.

But change, particularly technological change, does occur and often at a very rapid pace. To illustrate. In 1956 approximately sixteen thousand persons[8] in Newfoundland gained all or part of their cash income from logging; by 1959 this had been reduced to twelve thousand[9]; by 1961 it was nine thousand[10]; and by 1968 it had been further reduced to less than five thousand persons[11]. Most of these reductions have been a result of the rapid technological changes that have occurred during the same period. Further, these changes have been the result of the combined affects of a number of different items of technology, many of which have produced different worker reaction

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[7]See for example, Edward H. Spicer (Ed.) Human Problems in Technological Change (New York: John Wiley and Sons, Inc., 1952).

[8]Calculated from data presented in Chapter II.

[9]Gwyn, *op cit.*, p. 199, reports twelve thousand loggers on strike in 1959.

[10]Peters, *op cit.*, p. 64, reports 9,322 persons employed in logging in October 1961.

[11]An approximate figure calculated from data presented in Chapter V.

both in terms of type and degree.

Not only does the logging industry offer the opportunity to study a problem area that has long been of general interest to the Social Sciences but, unlike most other studies of technological change, it offers the chance to focus on a number of different technological items which create a series of events, which eventually produce a process with a definite direction and a definite goal. It is expected that, by examining these different items of technology, it will be possible to determine whether the individual worker finds one item more acceptable than another and, if so, why.

The study then, in its refined problem area, focuses on a series of technological changes which have cumulative effects. More directly, it focuses on reaction and resistance to change. It attempts to delineate the dimensions of change and to outline its causes, its process, and its effects. Finally, and equally as important, it attempts to construct and test, in a preliminary fashion, a classification of different types of technology in an effort to determine whether one can differentiate between items of technology that will find ready acceptance and those that will not.

The Approach

The approach to the study is a product of the twofold problem area just outlined. Generally it consists of dividing the material, where possible, into two categories which may be termed *restricted* and *non-restricted.*

The restricted approach is applied to data which may have limited application outside the logging industry and outside provincial boundaries. It is assumed that the present day Newfoundland logger is a product of a unique cultural and historical background and that there may be many local specific characteristics which need have no application outside this province. Some of these characteristics may have had influence on the technological changes that have occurred or the workers reaction to them.

The second approach has more general application in that it attempts to develop and test logical constructs which may have relevance outside the local area. These are developed in Chapter IV. In general, these are generated by focusing on the work group level and attempting to predict the results of new technology there, as opposed to the societal or cultural level. The point of contact that new technology has with either of the latter two levels is through the work group and it is felt that resistance or reaction will first be generated there.

While these two approaches can be analytically separated, particularly at the extremes, they often cannot be separated at the empirical level and localized characteristics can often modify the constructs, or the worker reaction predicted by these constructs. To overcome this it has been necessary to include chapters which combine both approaches (particularly Chapter V) but even here the two approaches are separated under different subtitles. Other chapters, using the restricted approach, also present material which is of importance for the non-restricted approach, but this data is summarized

in the conclusion to each of the chapters so that it is unnecessary for a reader who may be interested in the non-restricted material, to read each chapter in detail.

The restricted approach is mainly used in chapters II, III, and VIII, while chapters IV, VI and VII make use of the non-restricted data and the constructs, if not the material used to test them, may have general application outside localized areas. Chapter V integrates both approaches and presents material of both a restricted and non-restricted nature.

The Method

The paucity of basic research data that was outlined earlier combined with the broadness of scope intended, means that it was not possible to develop rigid theoretical constructs before going into the field and it was first necessary to collect basic historical data and to extrapolate general trends from this. The preliminary research was therefore of an exploratory nature. It was not until this basic data had been collected that more precise hypotheses could be formulated and, while these are developed in chapter IV, it was felt that at this late stage it would be beneficial to continue with the exploratory research and present, as well as the preliminary testing of hypotheses, a wide ranging report on the forest industry with particular emphasis on the dimensions of change that have occurred as a result of new technology.

Research was carried out in three fairly distinctive stages during a twelve month period.

The first stage occurred during the summer of 1969 and included, as well as visits to particular logging areas, the collection of basic statistical data from the two paper companies. In this connection it was found that The Anglo-Newfoundland Development Company Ltd., collected and retained a much more comprehensive set of files on its operations and on the workers than did the Bowaters Paper Company Ltd., who, until very recently, did not retain statistical data, of the type required here, at any central office. Data from the first company was heavily relied upon during the course of the study but was supplemented by data collected from the Glenwood Division of the Bowaters operations which had also retained comparable data on its operations.

The second phase was carried out during the winter of 1970, particularly the month of January, and involved collection of data from the files of The United Brotherhood of Carpenters and Joiners of America, the union representing loggers, and discussion with the union executive. Visits to the logging areas to determine the differences between summer and winter operations were also undertaken.

The third phase involved the interviewing of individual loggers and was carried out during the spring and early summer of 1970. At first it was intended to use a mailed questionnaire for this purpose but pre-testing indicated that response would be very low. Instead it was decided to personally interview loggers. The open-ended interview was used as a technique because it permitted wide ranging discussion and allowed the researcher to explore areas that could not be studied if a more formal technique was utilized. Since the research already

fell into the exploratory category, it was decided to take full advantage of the scope permitted by this technique.

Presentation of Material

The paper is written, as much as possible, along the lines noted for the twofold approach to the study with both chapters II and III being largely restricted in detail.

Chapter II outlines the history of logging from its earliest development during the sawmill era to the subsequent change to pulp and paper. The movement of populations along the coast line and finally into the interior is traced and the development of settlements depending on logging for their economic base is included. A statistical breakdown of the different workers participating in logging is also given.

Chapter III focuses more directly on logging. It outlines the organizational structure and presents descriptive material on the different levels. The individual logging camp, as the center of the line production unit, is examined in detail, and the work activities, the different statuses, the work process, and, most importantly, the technology that is used in each work function, are included.

Chapter IV moves to the non-restrictive approach and is largely theoretical. A classification of different types of technology is developed and logical constructs based on this classification are included.

Chapter V utilizes both the restrictive and non-restrictive approaches. Different items of technology are placed in the

classification system developed in the previous chapter. As well, restrictive data dealing with the introduction of each specific item of technology is included. Of particular interest here is the differences between worker-owned and company-owned technology.

The next two chapters follow the non-restrictive approach, and deal mainly with resistance to technological change. Chapter VI presents data indicating resistance on the individual and interpersonal level while chapter VII examines resistance as an industry wide phenomenon mediated through a formal structure.

Chapter VIII returns to the restricted approach and is intended to highlight changes that have occurred in the organization of the paper companies, and in the individual logging camp operations, as a result of technological change. Whereas chapter III focuses on the conventional logging system chapter VIII focuses on the mechanized system and is intended to demonstrate differences between the two.

The findings of the study are outlined in capsule form in chapter IX; the last chapter. The conclusions are presented in two sections, the first dealing with the restricted approach and, the second, dealing with the non restricted approach. As well, suggestions for further research are included.

Supporting data is included throughout the presentation and is derived from four sources. From published and unpublished sources; from the files and records of the two paper companies; from the records of the loggers' union; and finally from interviews of individual loggers.

It is hoped that the overall approach, and the various tech-

niques used, will contribute to the understanding of technological change, and will add to the limited data available on one of the province's main resource industries.

CHAPTER II

EMERGING PATTERNS OF RESOURCE UTILIZATION

The absence of basic research data dealing with the forest industry of Newfoundland means that any attempt to understand technological change in that industry must first be grounded in basic historical data. This type of data is also best suited for outlining the nature of the population using the technology and the resource. This chapter will therefore be concerned with tracing the development of logging; of outlining characteristics of the population using the resource; and attempting to determine alternative resources available to them. All or any of these factors may have had some affect on either the technological change that occurred, or on the reaction to that change.

Early Settlement Patterns

One of the main factors influencing the settlement pattern of the island of Newfoundland was the nature of the first resource used. Fishing, of course, requires easy access to the sea and families using that resource tended to settle along the coast line and on the nearby islands. Two related factors; the primitive technology which seriously limited mobility and put a premium on proximity to the fishing grounds; and the rugged coast line which placed a limit on the amount of good shore space for processing fish; meant that settled areas tended to become easily saturated with people. When this happened

the surplus population moved down the coast and new settlements were born. Evans[1] describes this process;

> This then is the picture of a community situated in a hidden cove on the coastline of Newfoundland. Each fisherman has a small homemade boat which he rows to his fishing grounds. Each also has a large and growing family. As the fisherman has to row to reach a place to fish, the available fishing areas where fish may be taken by primitive fishing gear, and space on the rugged shore-line where fish may be processed are soon taken over by fishermen who claim it for themselves. It became a social custom that was mutually accepted that each man's fishing berth and landing area was his exclusively. He could will or give these to his heirs as real property. However as each man had a large family, only one son (usually the youngest) could inherit the economic base to his existence as the inherited berth, gear and seaside property could only support one fishing family. The surplus sons had to find their own economic base when they reached maturity and wanted to establish a family of their own. Again as the closest economic areas close to the community were all claimed, the surplus population had to look elsewhere. Therefore as communities grew to the level that the available fishing facilities could support, the surplus fishermen moved down the coastline looking for new fishing areas. When these fishing grounds were located, a site had to be found for a home within range of the fishing grounds by a small homemade boat. This range restricted the choice of homesite to the best possible area having land for agriculture and forest for timber and shelter for the boat. When a decision was made and a site chosen, a home was constructed. Other members from the original community and from other communities then moved in and the process started over when the population reached a level that the available fishing resources would support.

The above description is one of several that attempts to explain the movement of the local population along the coastline. Some disagree on points of detail but most agree on the important

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[1]F. J. Evans, "The Challenge and Conflict of Change" (unpublished paper, Memorial University of Newfoundland).

points for this study. These are: that the early settlements[2] were largely economically self-sufficient and were based on the household or family unit; that fish was produced for home consumption as were various agricultural products, particularly root crops; finally, that timber from the coastal forests provided the material needed in home construction, in boat building, and in heating.

The only one of the basic resources that did not renew itself annually was timber, and, as the number of settlements grew so did the pressure on the more easily accessable stands. Eventually the deterioration of the coastal forests forced fishermen to migrate into the bays during the winter months where high quality timber was still available. The areas where transhumance was most widely practiced in insular Newfoundland, was the Notre Dame Bay - Bonavista Bay areas, where, in the mid and late stages of the nineteenth century, it marked a transitionary stage prior to settling permanently in one or the other area.

During the latter stages of the nineteenth century a market demand for local lumber began to grow in St. John's and in some of the larger fishing settlements, and this encouraged several of the migratory families to remain in the wooded areas during the summer months to supply this market. As the market continued to grow so did the collection of winter homes which eventually became permanent settlements.

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[2]Because of the continuing debate in Sociological literature of the precise definition of the term "community" it will not be used in this paper. Instead the term "settlement" will be used and is defined simply as a place of residence.

Commercial Sawmilling

Transportation of lumber from the sawmill area to the market was by water so that the sawmilling settlements tended to develop within easy access of the ocean. A second factor limiting location of sawmills was that the raw material on which they depended had to be transported to the millsite by water and it was important that the rivers not have any long stretches of turbulent water which would make the driving of full length timber difficult. The favoured areas in the east-central portion of the island were in the Gander Bay - Bonavista Bay areas. The smaller bays flowing into Bonavista Bay were choice locations for sawmilling and the most popular were Alexander Bay and Freshwater Bay both of which had large rivers flowing into them. David Smallwood, Grandfather of the present Premier, operated what must have been one of the first commercial sawmills in the Freshwater Bay area as he operated a mill on the Gambo River from 1862 until 1869[3]. Alexander Murray, Newfoundland Geologist, reported in 1876;

> Two mills are already established on the Gambo, one driven by steam and the other by water. The former of these is located at the mouth of the river convenient for loading the lumber into seagoing craft. The latter is about a mile above the outlet of Mint Brook[4].

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[3]J. R. Thoms, "The Sawmill Pioneers of Newfoundland", The Book of Newfoundland, ed. J. R. Smallwood (St. John's: The Newfoundland Book Publisher (1967) Ltd., 1967), IV : 417.

[4]Ibid., p. 418.

By 1891 the Freshwater Bay area[5] had a considerable population by then current standards as the census of that year reports a total of 273 persons living around the head of the bay. Norris Arm, on the Exploits River had a population of nine, and Botwoodville (now Botwood) at the mouth of the Exploits River had a population of forty-nine recorded in the same census. Sawmilling however remained confined to areas accessible from the sea and the vast interior of the island remained unsettled.

The Railway

The greatest boost to commercial sawmilling came from the construction of the trans-insular railway in the mid 1890's. The railway opened up the previously inaccessible interior and, as well as using a great deal of material in the construction stage, it provided relatively cheap transportation of the finished product to a seaport where it could be shipped to the local or newly developing export market.

The location of the new mills was influenced by two factors. The rail-line for transshipment of the finished product, and a large body of water flowing from the logging areas in the interior for transportation of the raw material to the mill site. By 1900 mills were operating, or in the process of being built at Terra Nova, on the river of the same name; at Glenwood and Soulis Brook (now Benton) on or near the Gander River; and at Millertown, Norris Arm and Botwoodville on the Exploits River or its headwaters. These mills ranged in size up

[5]Includes Gambo River, Mint Brook, Dark Cove, Middle Brook, and Hay Cove.

to a capacity of 45,000 f.b.m. per day.

Comparison of Fishing and Sawmilling Settlements

The era of large scale sawmilling was of comparatively short duration but during that time it had a marked effect on the pattern of settlement. The settlements established with sawmilling as a base, grew for the next decade. Table 1 illustrates this growth and although the data for 1911 was taken after sawmilling had peaked the population growth in most of the settlements listed was caused by it.

TABLE 1

POPULATION TOTALS, SELECTED SETTLEMENTS

Settlement	Year			
	1891	1901	1911	1921
Badger	. .	23	136	284
Botwoodville	49	541	852	1018
Gambo	79	107	344	305
Glenwood	. .	245	180	57
Millertown	. .	147	232	339
Norris Arm	9	83	459	570

Source: Census of Newfoundland 1891; 1901; 1911; 1921.

The Sawmilling settlements were different from any that had existed up to that time. The fishing settlements now carried on a combination of partial market oriented fishing and subsistence

agriculture. There was a low level of skill specialization as each family was an independant self-sufficient unit. The skills existing between different residents of the settlement were much the same as each unit carried on essentially the same activity.

The sawmilling settlements, on the other hand, were from the beginning, market oriented manufacturing settlements. There was a division of labour with different skills and different persons specializing in different tasks. Thus instead of a totality of skills universally possessed, each member possessed different skills or different combinations of them.

Subsistence agriculture appears to have been less important in the sawmilling settlements than in the fishing settlements particularly during periods of peak wage employment. Ottar Brox[6] has discussed the importance of that sector in the overall outport economy.

> . . . the obvious economizing strategy for the outport household then, is to utilize subsistence opportunity and limit the use of cash for those goods and services that the household finds it unprofitable to produce.

The use of the term cash may be somewhat misleading because in most settlements different forms of credit were used and cash was rarely seen. This does not nullify the principle involved but, in fact, the conversion is more direct. Table 2 illustrates data from selected sawmilling settlements.

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[6]Ottar Brox, Maintenance of Economic Dualism in Newfoundland, Newfoundland Social and Economic Studies No. 9 (St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland, 1969) p. 17.

TABLE 2

NUMBER OF FAMILIES, NUMBER OF FAMILIES CULTIVATING

Settlement		Year			
		1891	1901	1911	1921
Badger:	Number of families	. .	10	26	47
	Number cultivating	. .	. .	. .	27
Gambo:	Number of families	13	17	52	49
	Number cultivating	. .	9	17	49
Glenwood:	Number of families	. .	44	28	8
	Number cultivating	. .	. .	15	. .
Millertown:	Number of families	. .	22	46	62
	Number cultivating	. .	. .	. .	25

Source: Census of Newfoundland 1891; 1901, 1911, 1921.

In the years 1891 and 1901 little or no cultivation was carried on in any of these sawmilling settlements although in the latter year Gambo began to move in that direction. In 1911 however, after the end of the sawmilling era, Glenwood showed a movement towards cultivation and the other settlements followed at a later date, apparently when wage labour had passed its peak in each area. This would appear to indicate an inverse relationship between cultivation and wage labour; the cash or wage economy being preferred but during periods of low employment there was a general movement towards subsistence. This was quite different from the fishing settlements where both economies were combined.

The development of sawmilling changed the settlement patterns of the island and instead of simply settling along the perimeter of the coastline there was a general movement inland, a direction that is still maintained today. As well, sawmilling created a different type of settlement since it demanded specialization of its workers. There also appears to have been less reliance on subsistence agriculture in sawmilling areas and a stronger reliance on cash or wage income.

The Paper Mills

Most of the sawmills operating in Newfoundland in the early nineteen hundreds depended on one species of timber, white pine (*Pinus strobus* L.). The pressure on the species both from overuse and the ravages of forest fires, which had become a major problem since the opening of the railway, was severe. As well, some of the larger mills, particularly the one operated by Lewis Miller at Millertown, were finding that much of the white pine on their land holdings was over-mature and not suitable for lumber.[7]

The Newfoundland Railway depended on the sawmills for most of the business on the western portion of the rail line and the difficulties of the Miller interests were viewed with alarm by Sir William Reid, then the operator of the railway.[8] In 1903, Reid together with H. J. Crowe, formed Newfoundland Timber Estates Limited and gained

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[7]R. C. Goodyear, "Historical", Report of the Newfoundland Royal Commission on Forestry, 1955 (St. John's: Queens Printer, 1955), p. 197.

[8]Ibid.

control of the Miller interests at Millertown, Glenwood, and Lewisporte[9]. They then set about purchasing the land holdings of other sawmilling companies.

The Newfoundland Timber Estates Limited was formed primarily as a holding company to secure control of the productive forest land in the east-central portion of the island. Crowe, an immigrant from Nova Scotia, had been impressed by the large percentage of spruce (*Picea glauca* (Moench) Voss and *Picea mariana* (Mill) Bsp.) and fir (*Abies balsamea* (L.) Mill) and felt that a pulp mill would be a much better investment than lumbering.

A pulp mill had been operated by Harvey and Company at Black River beginning in 1897. The mill had operated successfully with a capacity of twenty tons per day and had turned out a high quality product. However it was plagued by water shortages during the drier seasons and finally, after five years, it ceased operation[10].

Crowe, on behalf of Timber Estates Limited approached the Harmsworth family, then the operators of a chain of British newspapers, and with the evidence of the Black River mill, convinced them of the feasibility of a pulp and paper mill on the island. In 1905 the Anglo-Newfoundland Development Company Limited (hereafter A.N.D. Co.)

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[9]Ibid. p. 198.

[10]Robert D. Peters, "The Social and Economic Effects of the Transition from a System of Woods Camps to a System of Commuting in the Newfoundland Pulpwood Industry" (unpublished Master's Thesis, Memorial University Library, Memorial University of Newfoundland, 1966).

was formed. Shortly after incorporation it controlled the land already owned by Timber Estates Limited. The latter company had no direct licenses or leases from the crown but absorbed lots. Some lots had not been taken over when title passed to A.N.D. Co. and hence title was transferred direct from the crown so that it is difficult to determine exactly how much land was held. Generally, at the time of incorporation, A.N.D. Co. held approximately 2,315 sq. miles of leasehold land to supply a mill of 30,000 tons. Today this has increased to 7,585 sq. miles (47% of which is productive) and the mill capacity to 330,000 tons[11].

By 1910 A.N.D. Co. had purchased the holdings of most of the mills east of the Topsail divide. Most mills ceased operation immediately on purchase. The only ones to continue were the Horwood mill at Norris Arm which remained in operation until about 1937 and the Botwood mill which continued through agreement with the paper company. Although Reid, and several other companies, attempted to develop large sawmills in the east, they were not successful. In later years the pattern of land ownership no doubt operated against large scale sawmilling as, since the paper companies controlled large blocks of land in the interior, sawmills were limited to the narrow 3 mile strip (Fishermens Limit) around the coast line. By 1912 large scale sawmilling, with the exceptions mentioned above, had ceased in the east and the mills deteriorated to the family type units existing today.

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[11]Source: Anglo-Newfoundland Development Co. Ltd.

The development of the paper mill on the west coast of the island followed a similar pattern although at a much later date. In 1923 Newfoundland Pulp and Paper Company purchased the timber and land holdings of Fishers Mill (now Corner Brook) and in the same year began construction of the paper mill. In 1926 the International Power and Paper Company purchased the property and in 1938 it was acquired by the Bowater's Nfld. Pulp and Paper Mills Limited[12] (hereafter Bowater's). The pattern of land holdings and grants followed those already set in the east by A.N.D. Co. although the limits were scattered over a much wider area. Today Bowater's control 12,180[13] sq. miles of land to supply a mill of 1,300 tons capacity per day[14].

Pulpwood Production Phases

In the first years of pulpwood production for the mill at Grand Falls (A.N.D. Co.) the timber was cut and transported in the same way as the material used in sawmilling. An example of this was that in the early years long length timber was transported direct to the mill site where it was then cut into the required length. But the river drives of long length timber were difficult and frequent log jams occurred. The length was therefore reduced, at first to sixteen feet, then to five feet two inches, and finally, to the present four foot lengths. Similarly the technology used was in a state of flux

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[12]Peters, *op cit.*, p. 6.

[13]Ibid., p. 33.

[14]Ibid., p. 6.

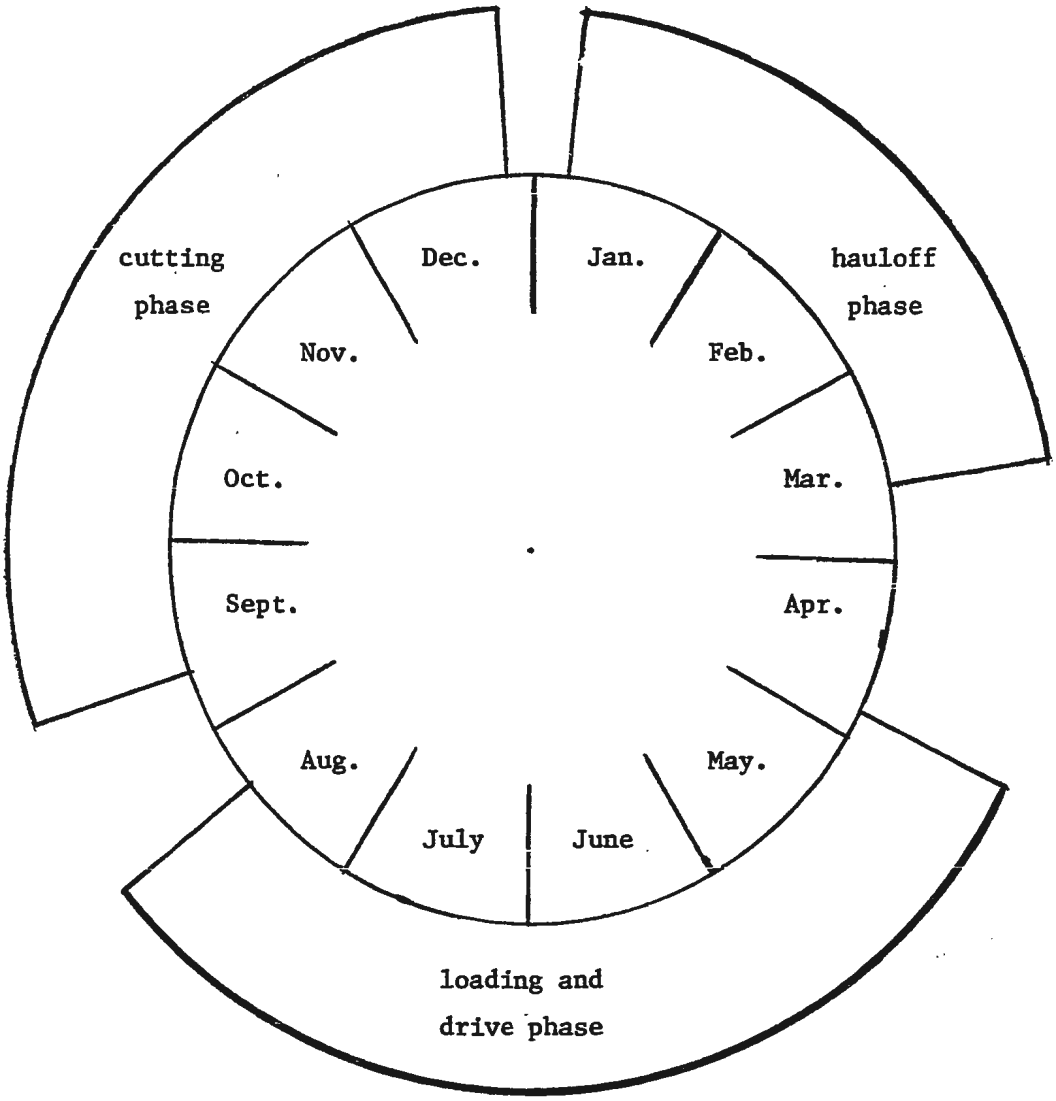
for many years. At first, the crosscut saw which had been used to cut sawlogs, was used. In the early twenties this was replaced by the buck saw. It was not until about 1925 that pulp wood production settled down into the pattern it was to exhibit for the next three decades. Since this date also coincides with the opening of the Bowater mill on the west coast it is from this point on that pulpwood production will be examined.

The production system that materialized in 1925 was a circular three-phase system, governed by seasonal climatic conditions, and repeating itself each year season by season. (See diagram 1). The first phase was the actual cutting of the timber. It was then cut into the required length and piled in a location where it would be accessible later when the snows came. The cutting phase occurred in the fall of each year and usually lasted from September to late November or early December. Some cutting, on supplementary contracts, occurred in the spring and summer but this was small in comparison with the amount cut in the primary fall cutting phase.

The second phase was the transportation of the timber from the location where it had been cut and piled to the frozen lakes and rivers. This took place during the winter, beginning in January and lasting until mid March or until all the timber had been transported. This phase, the "hauloff", was probably more dependant on climatic conditions than any other phase. A good hauling season, i.e. frost and several inches of snow, helped to shorten the hauloff period as each camp unit had only a limited amount of timber (the "cut") to

DIAGRAM 1

THE YEARLY LOGGING CYCLE



Outside Circle = Logging phases.

Inside Circle = Months.

transport to the river system. Poor hauling conditions tended to lengthen the hauloff period so that it might extend into early spring. In particularly poor years the hauloff failed and the full "cut" could not be transported to the rivers.

The third phase involved the transportation of the timber by water either to a central railway terminal where it was then retransported by rail to the site of the paper mill or, on the Humber and Exploits water systems, direct water transportation to the mill. This phase, the "drive", usually took place in the spring and early summer after the early spring flood waters had receded.

Table 3 shows the number of persons employed in the woods department of one paper company on a month by month basis for the complete yearly cycle. Graph 1 reproduces these figures in graphic form. The cutting phase for the particular year reproduced here is shorter than normal, running only up until mid or late November, (the figures displayed represent the number of persons employed at the end of each month) but otherwise the curve is representative of the yearly employment cycle.

The largest employment is during the cutting phase. The hauloff phase in January and February employs the second largest group. The drive phase employs the smallest number of the three. It should be noted that other work is carried out during the drive period, particularly during its later stages. It is at this time that road construction is underway, new campsites are chosen, buildings moved, and repairs are made to river dams and other fixed equipment. The persons

TABLE 3

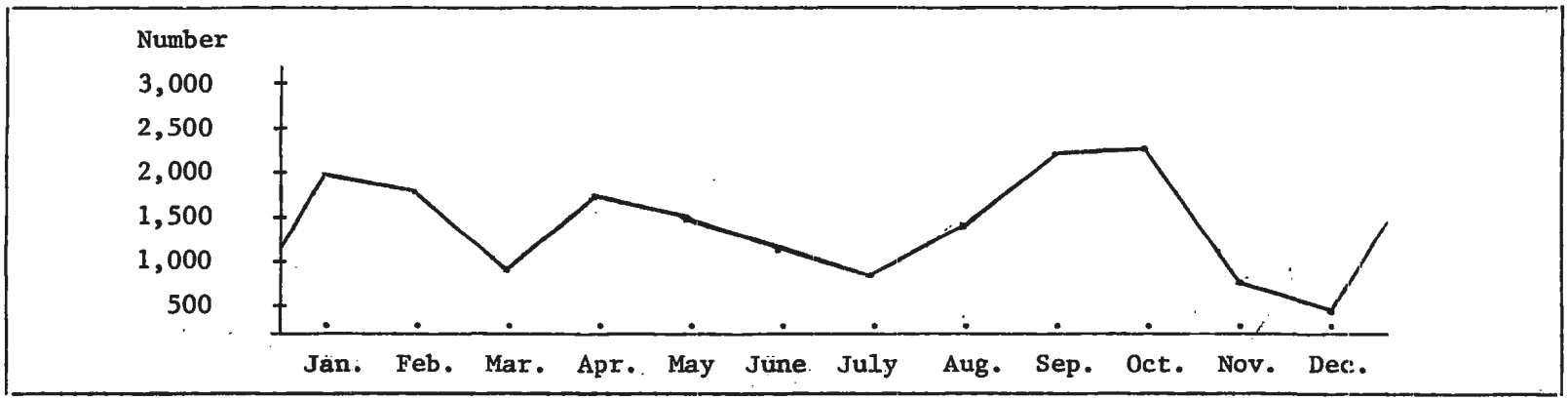
NUMBER OF EMPLOYEES AT END OF EACH MONTH (1953)

Month	Employees
January	2009
February	1768
March	941
April	1705
May	1537
June	1246
July	823
August	1440
September	2219
October	2286
November	737
December	420

Source: A.N.D. Company Ltd.

GRAPH 1

NUMBER OF EMPLOYEES AT END OF EACH MONTH



Source: from Table 3 above.

engaged in these activities are included in the figures presented for the drive phase. One company official estimated that in the late portion of the drive phase about sixty percent of those shown are actually engaged in transporting and loading the timber and the others are employed in the work outlined above.

Of equal importance to the peak period of wage employment are the periods of minimum employment. These occur in the breaks between the different phases and are represented by the dips in the curve. The break between the cutting phase and the hauloff occurs at Christmas; the break between the hauloff and the drive occurs around Easter and is for an extended period because of the breakup of the rivers; and the break between the drive and the cutting phases occurs in late July and early August. The minimum number of persons held on the payroll is 420 for December and increases to 941 maximum for the breaks between any two phases.

The heavy inputs of seasonal labour indicated by Table 3 were an important consideration for the organization of the woods departments of the two paper companies. The rapid seasonal change in employment figures from 420 to a high of 2,286 meant that only a portion of those working at the peak period could also be working at the minimum period. This wide seasonal fluctuation gave rise to different methods for utilizing logging as a source of cash income. There were basically two dichotomous groups who can best be separated on the basis of the settlements from which they came, either a logging settlement or a fishing settlement. These were supplemented by a third group, of minor

proportions, which moved in and out of logging almost at will.

Logging Settlements

The development of sawmilling in the late nineteenth and early twentieth century attracted workers who then became dependant on this one resource as a source of cash income. After the international paper companies gained control of the productive forest land surrounding the sawmilling settlements they were changed from manufacturing areas and were used as entry points into the logging districts. Men from these settlements, now logging settlements, provided the nucleus of expertise around which logging was organized. From places such as Gambo, Badger, Millertown, Glenwood, and Deer Lake, came the area managers, the scalers and other mid level staff employees so that these settlements supplied the men who made up the bulk of the formal organization of the woods department of both companies.

These same settlements supplied many of the teamsters, the boat operators, the river drivers, and camp foremen, so that as well as supplying the staff expertise these same settlements supplied much of the specialized line expertise. Some of these workers were employed almost all year round, appearing in one phase as perhaps a river driver, and in another as a teamster. Thus, while varying situs, the occupational status remained consistent and they are, therefore, a fairly close approximation of the single status worker of the industrialized factory system.

Fishing Settlements

Because of the large seasonal peaks of employment in the production of pulpwood it developed into an important resource for a second group. These men, the fishermen who populate the coast line, particularly the northeast coast, used logging as an additional source of cash income, combining it with their traditional fishing economy. One might well argue that the existence of the inshore fishery, or some facsimile of it, was a prime requirement for the paper companies well into the 1960's. Conversely since the inshore fishery, particularly during periods of poor catches, provided the bulk of seasonal labour involved in the cutting and hauloff phases, the combination of both of these resources helped to make each a viable adaptation and the fit between the two probably helped perpetuate the inshore fishery.

The fishermen-loggers, developed different techniques for utilizing the two resources. The household remained the basic economizing unit and different members might use different resources which could then be pooled. Thus a father might fish and a son might log. The break in logging occurred in July and August at the peak of the catch in the inshore fishery so that the logging member of the family would then be able to partake in the fishery during its highest catch level. If there were only one male adult member of the family he could participate in the fishery during the summer and in logging during the cutting or hauloff phases.

Occupational Pluralism

These two basic dichotomous groups were further supplemented by a third group who, like the fishermen, also varied status. These persons generally possessed a specialized skill, such as carpentry, which was sometimes in demand in other sectors of the economy. They are not so easily separated on the basic of place of residence since persons from both types of settlements tended to participate. These persons made up a very small percentage of the total number of loggers particularly during the earlier years. Later, as the construction sector grew, particularly during the construction of the large American bases during the 1940's and the highways during the late 1950's these became more numerous as equipment operators and truck drivers also became involved. However, except for this exception logging depended on a rather stable base of fishermen loggers and single status loggers until the late 1950's when the third group started to become statistically important. However this last stage is well into the central topic of this paper, technological change, so that this group need not concern us here except to note that they did exist but were of little importance until later years.

Statistical Breakdown of Loggers

Table 4 outlines data on the number of men working for one of the paper companies and the length of time worked in one yearly cycle. These figures are consolidated and reorganized in Table 5. Those working less than seventy-five days have, for analytical purposes, been taken to represent the occupational pluralists, mostly fishermen-

loggers, while those working more than seventy-five days have been taken to represent more permanent loggers.

The cutoff point is largely arbitrary because the number of days that a pluralist will work in woods work in any one yearly cycle depends on a great number of things. A poor fishery would increase the need for cash from the logging sector while a good fishery would decrease it. The figure has been chosen because it is below this point that the largest group of men seasonally employed drop out. Also seventy-five days represents the longest period that any person could be employed in a single phase and he would have to vary situs to continue longer than this. This is something that a pluralist was unlikely to do. The direction of error in this estimate is controlled and is to underestimate the number of pluralists involved in logging.

Generalizing from these tables to the entire population is again hazardous. The Bowater's Company had not, during this period kept any central records so that one is unable to determine accurately even the number of employees. However that company usually employed at least 1.3 times the number employed by A.N.D. Co. because of a larger budgeted cut. This correction factor is again a conservative figure and the direction of error is to underestimate the number of persons employed in pulpwood production. On this basis there were approximately 16,000 persons employed directly in pulpwood production during the year when these figures were taken (1953). Of these, 9,760 or sixty-one percent were occupational pluralists, mostly fishermen-loggers and 6,240 or thirty-nine percent were single status loggers

TABLE 4

CATEGORY OF DAYS WORKED BY NUMBER OF MEN WORKING

Days worked	Number of men working
00 to 10 days	
11 to 25 days	1,562
26 to 50 days	1,430
51 to 75 days	1,095
76 to 100 days	761
101 to 125 days	570
126 to 150 days	417
151 to 175 days	283
176 to 200 days	201
201 to 225 days	143
226 to 250 days	89
251 to ---	171
Total	6,722

Source: A.N.D. Co. Ltd.

TABLE 5

SUMMARY: CATEGORY OF DAYS WORKED, BY NUMBER OF MEN WORKING

Days worked	Number of men	Percent of total
Up to 75	4087	61
75 and over	2635	39

Source: from Table 4.

who may or may not have varied situs within the production phases. The first group came mainly from the fishing settlements and the second group came mainly from the logging settlements and nearby areas.

Conclusions

The early settlement pattern of the island portion of Newfoundland was influenced by the first resource used -- fishing -- and settlements tended to develop only along the coast line and on the nearby islands. It was not until the mid or late 19th century that these patterns were modified by the development of a second resource based on sawmilling, and the vast interior of the island was finally settled.

The sawmilling settlements were, like the fishing settlements, single resource areas and the subsequent failure of large scale sawmilling left many of these without a viable resource base. With the development of the pulp and paper industry, under the auspices of large international paper companies, in the first quarter of the 20th century, the settlements founded with sawmilling as a base were then used as entry points into the forests. The men in these settlements supplied the nucleus of expertise around which pulpwood logging was organized. The occupational status of these workers remained constant but they varied situs according to the phases, the cutting, hauling or driving phase, of the yearly logging cycle.

The heavy seasonal inputs of labour required in the different phases also attracted workers who combined logging with some other type of work or resource, usually fishing and construction work. This

variation of status was practiced by about sixty percent of those employed in the yearly cycle of logging. By far the most predominant group of these "occupational pluralists" were the fishermen (fishermen-loggers) who lived along the coast line and who combined summer fishing with either fall or winter logging as a supplement to the basic income from fishing.

The utilization of woods work by these two distinctive groups persisted from the earliest days of pulpwood logging up until the late 1950's when changes in the character of the logging industry began to appear. Before moving on to these changes, however, it is first necessary to outline some additional characteristics of the conventional system. These include an overview of the organizational structure which could cope with such wide variations in employment throughout the yearly cycle as well as a detailed examination of the work activities and the technology in use under the conventional logging system.

CHAPTER III

THE CONVENTIONAL LOGGING SYSTEM

In the introduction to this paper it was indicated that, as well as documenting the process of technological change, it is also intended to deliniate the dimensions of that change. One of the potential areas of change as a result of new technology is the organizational structure and the definition of work activities existing prior to the new technology. Further, in outlining the history of logging it was suggested that, because of the vast seasonal variations in the labour force, the organization of the woods departments of both the A.N.D. Company and the Bowater Company were extremely elastic and displayed characteristics unusual in an industrialized era. Some of these characteristics may be important to the technological changes to be discussed.

For these reasons this section will be concerned with outlining, in descriptive form, the organization and the operational techniques of the logging system. The period covered is from about 1925 up until the mid 1950's with emphasis on the latter years. The system existing during this period is commonly referred to as the "conventional logging system" as opposed to the "mechanized system" that has replaced it. The material presented is centered around the different levels of organization and the functions of these different levels as well as a documentation of the technology used by the line production units.

Levels of Organization

The woods departments of both the A.N.D. Company and the Bowater Company were organized around the cutting and delivery of the raw material to the two paper mills. The woods departments of both paper companies were subdivided into three fairly distinct levels of organization. First, at the apex, was the head, or the central woods office, located in the same town as was the paper mill itself. Second, and immediately below the apex on the organizational pyramid were the various divisional headquarters, usually located in the settlements that provided access to the timber lands. Third, there was the area where the actual cutting and hauling occurred. The focal point of this last level was the individual logging camp.

An overview of the operations of each of these levels follows. However, the first two, the head office and the divisional offices, are presented in fairly descriptive form, while the third level, the logging camp, is presented in more detail. Since the logging camp was the point of actual line operations and therefore the place of technological change, analysis is limited to that level. The descriptions of the other two levels provides an overview of the whole system as well as being useful in delineating the dimensions of change in a later chapter.

Woods Department, Head Office

The central or head offices of the woods departments of both A.N.D. Company and the Bowater Company, were responsible for the delivery of the pulpwood required at the mill site each year. Since delivery could only be carried out during the summer months, the wood

was stockpiled at the mill for use during the rest of the year. The amount remaining in these stockpiles during the spring determined the amount to be delivered during the following year and hence the projected "cut". Thus the amount of wood cut varied annually and could be as high as 500,000 cords for the Bowater Company.

The head office, because of its location in the paper town and the poor public communications and transportation then existing, had little control over the day to day operations in the field. Its main activity appears to have been in the areas of planning, particularly long range planning; co-ordination between the mill and the divisions and between the different divisions; and finally in setting minimum standards of operations which were used as guide lines by the different divisions.

As one of the two main operating divisions within the paper company (the mill itself was the other) the central office was required to take an overview of company operations and adjust its own accordingly. Change in the market demand or a change in the demand at the mill might require modification of its operations. Thus in the early 1940's the market demand for a high quality product, which could only be met by including a greater proportion of spruce timber in the mill mix, led to a greatly increased demand for this species by the Bowater Company. This finally resulted in the opening of the Glenwood division which was the only area under Bowater control on the island that could supply the quantity and quality needed. Glenwood was over two hundred miles from the mill site, on another water system, and timber from there

required rail transshipment.

The central office co-ordinated the activities between the different divisions to secure the required output at the projected average cost per cord. Each of the paper companies had within the boundaries of its timber holdings, areas of high cost and areas of low cost wood. The latter were those areas located on the same river system as was the mill thus permitting direct water transportation. The former were those areas located on other water systems and requiring transshipment. Thus the delivery of Glenwood timber to the Bowater mill at Corner Brook was comparatively expensive and required cost adjustment in the other divisions so that timber could be delivered at the projected average cost.

The co-ordination between divisions, and the amount of influence exercised within divisions, by the central office varied between the companies because of variations in the method of camp operation. The A.N.D. Company operated a series of standardized camp units. The operators of these camps were company employees who were paid a salary and a stated percentage of any monies remaining when the budgeted cut had been secured. The Bowater Company operated on the basis of a series of independent contractors who received progress payments on the production at various stages. The latter company had less direct control over its line production units since any change or innovation must first meet with the approval of the contractor who stood to gain or lose by it. Both companies transferred personnel and machinery between divisions, particularly that of a specialized type, and both

attempted to maintain some minimum standard of output and of work conditions. However, because of the differences noted above, the A.N.D. Company had more success in reaching these objectives than did the Bowater Company.

The final general function of the central office was in carrying out spot checks during the operating season and a final overall re-examination after each production phase had ended. These checks helped to enforce regulations covering good cutting, hauling, and operating practices. They included an examination of the cut-over area to insure that all merchandizable timber had been cut and transported to the river system, and a review of camp operating costs with breakdowns for each of the phases. In later years time studies of the various activities in each phase were carried out. After a period of time, these spot checks and phase re-evaluations produced a fairly standardized fund of knowledge,an ideal type of operation,against which each individual operation could be checked.

The performance of these three generalized functions of planning, coordination, and policing, of the central woods office was carried out by a staff of specialized expertise. Most of the men filling these statuses had been promoted up through the ranks so that, although the role was now specialized, they still possessed an overview of operating procedures for each of the three levels. The classification terms applied to these statuses are not common in occupations outside the woods industry but in general the central office staff included engineers, accountants, surveyors, scalers, cartographers, and general

office staff.

This overview of the functions of the central office and the statuses performing them is not exhaustive. Individual variations occurred between the two paper companies but the overview presented here is generally applicable to both paper companies. The essential point, for the remainder of this study, is that the central offices had very little day to day control over the line production units in the conventional logging system and were more-or-less limited to the three areas of planning, coordination, and policing outlined. More direct control was effected by the second level of organization, the divisional offices.

The Divisional Office

The two paper companies sub-divided the timber holdings into geographical units or divisions. Each of these operating divisions was then staffed and operated as nearly autonomous units. The number of divisions in any one company varied from time to time. As the timber resources in one area were exhausted the divisional office there might be closed, combined with some other, or moved to a new area. In the 1940's and 1950's the A.N.D. Company operated four divisions usually named after the settlement in which the divisional office was located. These were the Millertown, Badger, Bishops Falls, and Terra Nova divisions. The latter included territory bordering both the Terra Nova and Gambo river systems and since access to the latter area was through the settlement of Gambo the division operated a sub-office in that settlement.

Each divisional office was responsible for the operation of up to eighteen logging camps each. The degree of control exercised varied because of the different methods of camp operation practiced by the two companies. Also, since the divisions were responsible for both staff and line functions, their activities cannot be easily detailed or outlined. Perhaps the best method would be to outline the activities of the divisional office in the different phases of the yearly cycle.

Each spring the divisional office received notice of its quota and budget for the following year. It already had some camp units remaining from the preceeding years operations and it would then begin to plan new ones to replace those that had exhausted the wood supply near them. Roads were constructed into these new areas, new camp sites cleared and camp units constructed. Repairs were made to existing camps and dams.

During the late summer the camp operators or contractors reported to the divisional office. The areas to be cut were then determined and the projected cut and budget for each camp unit was set. All of this was preparatory to the actual cutting. In late August the cutters began filtering into the woods and the divisional office activities then changed from planning to actual operations. It was now responsible for the delivery and requisition of food and supplies for the camp units. Various divisional staff were detailed to cover the operations of three or four camps each. These included scalers who measured the output of each man cutting and hence for each individual camp. A two man team usually covered four camps as each

cutter was paid on a piecewood basis on an eighteen day period. The scaling team measured each man's production and paid him accordingly. It would then move to a second camp and repeat the process. This continued until all four camps in the scaling teams unit had been measured and paid, and then the process was repeated. After the peak cutting period had ceased, usually in late November, the cutters returned to their homes and the divisional office reverted to a planning office in preparation for the hauloff.

The responsibilities of the divisional office and its staff in the hauloff period were much the same as during the cutting phase. This again was one of the peak periods of activity in the woods and movements of supplies and equipment to sustain it continued. In addition to the scalers, equipment mechanics also went into the woods during the hauloff. Each mechanic was responsible for the maintenance of equipment at several camps usually consisting of a tractor or two per camp. After the hauloff had been completed the general office began compiling statistics on output and costs per camp and for the whole division. This last period lasting from late February to late May or early April was the period of least operating activity and company staff were usually engaged in re-evaluating the activities in the two phases completed.

During the late spring and early summer operational activity was centered around the drive. In some areas rail transshipment was necessary so that divisional staff supervised the loading of pulpwood onto railway flatcars. As well, the drive and sack were carried out

in all areas and this necessitated the continued movement of supplies to the crews engaged in them. At this period planning for the following years operations was carried out and actual construction of roads, dams and campsites was underway.

To carry out these activities the Divisional office maintained a variety of statuses. Generally these can be described as those necessary to accomplish the usual activities in the usual phases of the yearly cycle. Additional staff from the central office was co-opted when unusual circumstances prevailed. The divisional staff included truck drivers to move supplies to the campsites, accountants to record costs, tractor mechanics to keep the machinery that was used in operations and in road building in good condition, storekeepers to requisition supplies, scalers to measure individual and camp output, as well as a variety of persons involved in planning and building roads, dams, and camps.

A nucleus of these employees were retained year round and were augmented by additional part-time staff at peak periods. An example of this was the status of scaler. During the peak production period each scaler had an assistant assigned to him and these two comprised the team mentioned earlier. At the end of the peak period the assistant was "laid off" while the scaler was retained on the job as long as possible. Similarly with storekeepers and general office personnel. The men engaged as assistants were really in the position of apprenticeship and after several years experience, and if sufficient openings on a permanent basis were available, they could move up to

become a scaler or storekeeper in their own right.

For staff who did not possess skills which were easily adaptable, other methods of retaining them on the payroll were devised. Camp operators or contractors often became fire wardens during the peak fire season in July and August. Others were hired to perform special tasks on projects that appeared as almost "make work" activities. Work on the drive or on the loading plant as well as in road construction was available to some of them.

The two methods described above enabled the paper companies to retain a hard core of expertise which it always had on tap. The apprenticeship plan filled two functions: that of providing on-the-job training to recruits, and that of providing a cheaper method of getting the peak work done. The "make work" projects during the off-season provided the camp contractors and others with sufficient employment throughout the year so that they did not have to seek employment elsewhere and thus possibly be enticed away from the paper companies. Because of the emphasis placed on retaining a pool of skilled help the woods departments were able to increase the numbers employed by several thousand men with little inconvenience, inefficiency or disruption. If a job were not clearly defined or understood then the person who performed it was attached to "an experienced hand" until he had mastered it. If it were of a nature that could not be easily mastered, then the person who occupied the status was given sufficient other employment to justify his remaining at the call of the paper companies.

The description of the statuses and of the yearly cycle of divisional office operations presented here is a generalized overview of that organizational level for both paper companies. However it should be noted that individual variations did occur sometimes, particularly within the Bowater operations where the contractual system modified some of these activities at times.

A comparison of the two levels thus far discussed indicates that while the central office had very little direct control, the nearly autonomous divisional offices had more control, particularly through the policing statuses (scalers) attached to the camp units. But, even here, the line camp units exercised a degree of independent operation unusual in formal organizations where decisional processes and control is likely to be exercised at the top. Other unusual features of woods operation were the movement of divisional office personnel between staff and line activities within the different phases of the yearly cycle as well as the technique used to retain skilled help and of training specialized expertise. All of these are possible areas for change as a result of new technology, but before turning to that it is first necessary to focus, in considerably more detail, on the line production units, i.e. the individual logging camps.

The Logging Camps

Each division controlled anywhere from six to eighteen camps which were the actual line production units. The camps were linked to each other and to the divisional office either by water, by road, or a combination of both. At first these roads were little more than trails

(portage roads) through the wilderness suitable for the movement of men and supplies by tractor or horse-drawn sled. Gravel truck roads were later constructed and a telephone link was established.

The size of the individual camp units varied between the two companies because of the different system of operating them. More of the variation occurred in the Bowater operations where camp size ranged from a five or six man capacity for the smaller "jobber" units to fifty or sixty in the larger units. The A.N.D. Company usually operated a standard size camp of forty-eight man capacity. The amount of wood that was cut varied according to the size of the camp unit but, up until the mid 1950's, it was seldom greater than 5,000 cords per unit. The normal cut for a standard A.N.D. camp was around 4,000 cords per year. This low total cut was not a function of the cutting phase itself, as most camps could cut much more than this. Indeed, the crew of one camp often moved on to another after the budgeted cut had been secured in one unit. The ceiling on the cut was forced by the relatively short hauloff period. A period of forty to fifty days was the maximum that a camp operator could realistically expect and the budgeted cut was therefore based on the amount of timber that could be delivered to the river during this short period. The location, type of terrain and distance of the haul were factors taken into account within the alloted time period and the budgeted cut was adjusted on the basis of these factors.

Each logging camp was located as near as possible to the center of the area to be cut provided that the location afforded

suitable terrain and drinking water. Since the men had to walk to and from work there was a rather rigid limit to the amount of timber that could be harvested from any one campsite. Cutting took place in a circular area centering on the camp site and gradually progressing outward. The radius of the final circle of the cutover was seldom greater than two miles. However, the area to be cut was measured, not in distance, but in walking time. An hour each way was about the maximum permissible. Differences in terrain affected the distance that could be covered in this time period so it does not always convert to a standard distance. On this basis each camp had an average potential cut of from 12,000 to 15,000 cords which was usually harvested in a two to three year period. A standard logging camp therefore, unless it had some secondary use such as the drive, was constructed to last about three to four years. When the timber in each location was exhausted an entirely new camp was constructed in another location.

Each camp, both the larger Bowater variety and the standard A.N.D. type, were comprised of a minimum number of buildings as follows. The cookhouse where the food was prepared and the men fed was usually in the centre of the complex. The cookhouse also served as the communications centre with the outside. The telephone was located there and all visitors were sure to visit it for a "mugup". Internally, it was the centre of social discourse within the camp. A second unit, the bunkhouse, where the workers slept and remained during periods of poor weather was located adjacent to the cookhouse. The camp foreman and his assistant (second hand) as well as visiting company staff were

housed in separate quarters. At first this was attached to one end of the cookhouse but later a small separate unit, suitable for sleeping four to six persons and equipped with a small office area (the forepeak), was used. All camps were also equipped with a barn for sheltering the horses used during the hauloff. Other buildings were used for storage or for work which could not be performed outside. They included a small shed (ratproof) raised well off the ground in which perishable food items were stored. There was a saw filers shack where the cutting tools were kept sharpened, and finally a small multi-purpose shack where repairs to sleds and mechanical equipment might be carried out. The latter was sometimes equipped with a blacksmith's forge where the many pieces of iron used in the sleds and horseshoes could be shaped to fit.

Each camp unit had very few statuses that could be considered permanent as most varied according to the phase in which the camp was operating. The statuses which always had to be filled whenever the camp was open were as follows: The camp contractor and his second hand, the cook and one or two assistant cooks (cookees), and often a bunkhouse man who kept the buildings clean and the many stoves equipped with fuel. All the other statuses of the possible total of forty-eight varied according to the phase of operation.

In addition to the variation in status during the different phases other elements varied also. These included the overall organization of the work to be done, and the different elements of technology employed. Each of these phases will therefore be examined in turn on the basis of the above three criteria.

Cutting Phase

In the cutting phase each standard camp had total complement of about forty-eight men. The consistent statuses of contractor, second hand, cook, cookee and bunkhouse man have been noted earlier. One additional status, that of sawfiler, or the person responsible for keeping the cutting tools in good order, was added to the non-cutting staff. The rest of the men resident in camp were cutters. Thus in a forty-eight man camp only six persons were not actually involved in cutting the timber.

The organizing of the work was the responsibility of the camp foreman and his second hand, who divided the area to be cut into blocks or strips approximately 100 ft. in width. Each of these strips was then assigned to a cutter (his "chance") and he was responsible for cutting the timber on it. The laying out of the strips was vitally important to the man who would be assigned to it, as the type of terrain, the size and density of timber all affected his chances of being a big cutter. The fairness in which the men were rotated, at first to "a good chance" and then to "a poor chance", was the single most important factor on which the cutters judged a camp and its foreman and second hand.

Each cutter was an independent production unit in himself *vis a vis* the other cutters. The only exception to this was when a teenage son sometimes accompanied his father into the woods and helped on the father's strip. This was an apprenticeship stage in which the son was learning the skills required in cutting timber and he soon appeared as a cutter in his own right. While assisting his father he helped to

increase production on the strip by piling the timber, or helping to cut some, and therefore earned his keep while he learned.

Each cutter was responsible for cutting and piling the timber at a location where it could be scaled and later moved to the river. To do this he carried out five distinctive activities or functions. First there was the cutting of the strip road over which the timber could be hauled to the river during the hauloff. This involved cutting all the growth on the road area, and the usuable timber on the rest of the block. This involved felling each individual tree, removing (limbing out) the branches, cutting it into four foot lengths and finally piling it adjacent to the strip road where it was later scaled. Thus there is a necessary sequence of activities, five in all, which are always followed by the line unit in the cutting phase.

Each cutter used two tools or instruments in carrying out the activities in this phase, the buck saw and the axe. They were used interdependently and neither can be classified as more important than the other as each performed functions in the necessary sequence noted above. The buck saw and the axe were both used in clearing the strip road. The axe was used to fell smaller timber and the buck saw to fell that of the necessary size for pulp wood. The buck saw was used to fell the usable timber on the rest of the strip, the axe was used to delimb it, the buck saw to cut it into four foot lengths and finally the timber was gathered together and piled by hand. Thus there is an interchange of technology throughout the process with each item having a particular limited use.

The Hauloff

In the hauloff phase a camp crew was comprised of the standard statuses of contractor, second hand, cook, cookee, and bunkhouse man. Two additional complementary statuses were added. These were the barn tender i.e. a person to care for the horses used in hauling the timber and a carpenter. The latter kept the sleds in good repair and often doubled as a blacksmith. The rest of the camp crew were directly involved in handling the timber itself.

The organization of the work was much the same as in the cutting phase. A teamster was assigned a strip from which he was responsible for transporting all the piled timber to the river. When he had finished one he moved on to another in rotation, until all the timber had been moved to the river.

The movement of about 4,000 cords of wood to the river system during a short period of time required the use of many horses. Because they had only about two months during each year when they could be used, the paper companies attempted to contract as many as possible from owner-operators rather than keep a large herd themselves for such a short period of use. This fitted in rather well with the type of adaptation then practiced on the island. Horses were used by fishermen and lumbermen to haul firewood and for agriculture. Their use in the hauloff gave them a dual purpose. They were used in the logging sector to increase cash income since an owner-operator received a higher return than did a teamster. In the subsistence sector they were used to supply as many items as possible which the household would then not

have to purchase, thereby reducing the need for cash.

The hauloff was centered around the horse-drawn or tractor-drawn sled. Under poor hauling conditions and on rough ground a single ruggedly constructed sled (the "go-devil") was used. A platform apparatus was attached at one end to the sled and the other dragged on the ground, and it was on this that the timber was piled. Under better hauling conditions a set (two) of sleds of lighter construction but capable of carrying a larger payload were used. The sleds were usually loaded by hand by the teamster himself. Tractor drawn equipment was usually loaded by helpers who thus freed the driver to make maximum use of the power of the tractor. Unloading at the river was carried out in the same way except where large cuts were centralized into one "landing" area and here mechanical equipment was sometimes used.

The Drive

The drive phase of pulpwood production involved the least number of men of any of the three phases. It was also the least standardized in terms of numbers of men and numbers of crews. On rivers where wood could be driven direct to the paper mill the minimum number of work crews were two, the main drive crew and the sack crew. In addition, since most rivers had stretches of narrow river with rapid current and then branched out into larger ponds with little or no current, these two basic crews were often supplemented by boat crews on each of the ponds in the drive area. On rivers where re-transport by rail was necessary an additional crew, the loading plant crew, was

added. Each of these worked simultaneously and each was under the direction of a separate foreman.

The drive crew transported the main body of wood from where it had been left after the hauloff to the pulp mill or the rail terminal. Each crew had a compliment of up to a dozen men, and where large amounts of wood were moved several parallel crews were often involved. The drive crew moved from camp to camp, down the river system, following the main bulk of timber and clearing log jams as they occurred. On rivers which were interspersed with ponds a different system was used, rather than the "open" running exhibited by the river drives. On these ponds the pulpwood came under the influence of wind rather than current and to cross them "booms" were used. A "boom" consisted of full length timber ("sticks") approximately forty feet in length and joined end to end by chain to eventually form a large circle in which the pulpwood was enclosed. The booms were then towed by tugboat either to the loading plant at the rail terminal or to the inlet of another river where the pulpwood was again released and carried onward by the current.

The sack involved almost the same processes as did the main drive except that the sack crew cleared the shores of the ponds and rivers of wood that might have grounded there. On ponds the wood was put directly into a boom which was towed along for that purpose. On the rivers the sack crew collected the timber in the eddies and angles and put it back into the main river. The difference between the main drive and the sack was therefore in its speed of operation. The drive was a comparatively faster process since it did not try to clear the

difficult areas but left them for the sack crew "bringing up the rear".

The loading plant crew, where they were required, loaded the timber onto railway cars for transshipment to the mill. Several methods of doing this have been used but the most common during the late 1940's and 1950's was centered around a crane which lifted bundles of wood from the water. As the timber approached the area of the loading plant it was trapped in a holding boom. Inside the boom the timber was directed towards shore by boat crews by use of the backwash from the boat's propellors. Near the shore there were four crews of three men each organized in a "pontoon" assembly. Each pontoon crew piled the timber into steel cables or slings which when filled contained about one and three quarters cords each. The bundles were then lifted onto the railway flat cars as the crane moved from one pontoon to the next in rotation. A standard loading plant crew of seventeen men could, by using this method, load about thirty-five railway flatcars, each containing eight bundles, in a nine hour shift.

Looking backwards at the drive phase from the loading plant there were a series of activities in a necessary order or sequence and a necessary organized way of performing them. First there are the crane operators, the pontoon crews, the holding boom crew, the tugboat crew, the main drive, and finally, bringing up the rear, the sack. The technology employed by these different crews in the direct handling of the pulpwood was fairly standardized and of very simple design. It consisted of the pike pole, the peavee and the pulp hook. Additional supplementary technologies, such as riverboats and tugboats, were used on

a where-necessary and when-necessary basis.

The Line Production Unit

In outlining the three logging phases and the various work activities within each, a particular order has been followed, which is representative of the order in which they actually occurred in the yearly cycle. Diagram 2 reproduces the phases in pictorial form following the order in which they occurred; first the cutting phase, then the hauloff phase and finally the drive phase.

Moving from the three phases to the various work functions within them, there was also a particular sequence that was followed here, and this is illustrated by diagram 2. In this case the order was determined by three factors as follows: First, the demand at the mill for a particular semi-finished product. Second, the nature of the resource and environmental factors such as the various river systems and the type of terrain. Third and most important the technology in use. The limits of that technology meant that it was easier to handle four foot wood than the full tree so the timber was cut to that size before it was piled by hand. This partly determined the sequence in which the particular functions appear in the diagram. This sequence was probably arrived at by trial and error and some indication of this for the drive phase was given in the previous chapter.

Diagram 2 also indicates the various items of technology used in the line production system and indicates the various functions in which each item was used. The interchange of different items of

DIAGRAM 2

THE PULPWOOD PRODUCTION PHASES, THE ACTIVITIES AND THE TECHNOLOGY USED IN EACH

	Cutting Phase					Hauloff Phase			Drive Phase						
Activity	strip road	cut	de-limb	cut into rq'rd lngth	stump pile	load	haul	un-load	drive	sack	direct mill				
											tow	boom	pile	lift	car
Technology	buck saw axe	buck saw	axe	buck saw	hand	hand	horse and sled trac-tor	hand	pick pole pea-vee wood hook		boat		hook	crane	

technology and the dependence of one item on another can also be gleaned from the diagram.

Since diagram 2 presents a synopsis of the different logging phases, the work functions within each phase, and the item of technology used to perform each function, it presents a complete overview of the line production units in the conventional logging system. It is on the basis of the information presented in this diagram that the theoretical constructs presented in the next chapter are developed. However the diagram of individual phases will be reproduced where needed so that it is unnecessary to further summarize the line production units here.

Conclusion

This chapter has outlined the conventional logging system and has presented data on the three levels of organization within that system. The central office, the divisional offices and the individual logging camp have all been described and a breakdown of the functions and statuses have been given. Both the divisional office and the logging camp have been traced throughout the yearly cycle and variations in operations between each phase have been noted. The logging camp, the line production unit, has been discussed in more detail and the technology as well as the work functions have also been outlined. This material has been further synthesized and was presented in diagram form in the previous section.

The material given applies to the operations of both paper companies and is an overview of logging as it was practiced in

Newfoundland up until the mid 1950's which marks the beginning of rapid change based on new technology, the subject of the remainder of this paper.

CHAPTER IV

A CLASSIFICATION OF TYPES OF TECHNOLOGY

The previous chapters have outlined the historical development of logging as a source of cash income and have given a statistical breakdown of the different groups involved. The organization of the woods departments of the paper companies has been described and the work functions, and the technology employed in each function, have been outlined. The first several chapters, therefore, present a complete overview of the conventional (pre 1954) logging system.

It is now intended to examine those changes that have occurred in logging almost exclusively as a result of changes in technology. It is therefore necessary to focus on the direction and kind of technological change, how it occurred, whom it affected and how, and, most importantly, what resistance there was to it and from what source. To do this analytically it is first necessary to have some method of classifying different types of technology. An attempt at this will be made in this chapter.

Technology Defined

Definitions of technology have tended to be rather abstract and have tended to emphasize discovery rather than implementation. Thus the Encyclopedia of Social Science[1] defines technology generally

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[1]International Encyclopedia of the Social Sciences 1968, Vol. XV, p. 577.

as the application of science to production. This probably suffices in the abstract, but for working purposes it is much too broad. Specific items of a technological kit can, after all, be identified so on that basis one should be able to construct a more concrete working definition.

A definition which fits the above criteria has been developed by Schon. "Technology will mean any tool or technique, any product or process, any physical equipment or method of doing or making, by which human capability is extended"[2]. However the last phrase dealing with the extending of human capability is somewhat misleading. In this study it is intended to focus on change in an ongoing process where there is no change in the output from the system. Thus all the processes must have been carried out previous to the introduction of new items of technology and there is no extending of human capability. The definition will therefore be modified to read: Technology is any tool or technique, any product or process, any physical equipment or method of doing or making involved in the production, transportation, or consumption of goods and services.

Technological change will simply involve the replacement of one item of a technological kit which is being used in an ongoing process by some other item, which will be used in the same process or combination of processes.

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[2]Donald A. Schon, Technology and Change (New York: Dell Publishing Co. Inc., 1967), p. 1.

Classification of Technology

If definitions of technology have tended to be rather abstract and vague and have emphasized the discovery aspect, the same is true of classifications. The latter, of course, tend to follow the former and because of the concentration on discovery in definitions, classifications, when applied, tend to have rigid starting dates but open-ended closing dates. The Mumford classification is a case in point[3]. Technological change is separated into three phases. The medieval or eotechnic phase, the industrial revolution or paleotechnic phase, and the modern or neotechnic phase. Each of these phases, as indicated, corresponds roughly to a period of human history and they are based loosely on power and invention. The eotechnic phase was the preparatory phase where most inventions were made or foreshadowed. The paleotechnic phase involves the utilization of two types of power: muscle and machine. The neotechnic phase involves the utlization of machine power only and finally leads to automation.

The above classification is one of the few that considers the application of new technology as well as its discovery and, since the former is the point of interest here, it provides a useful starting point. The periods of interest are the last two, particularly the third, generally involving the application of new sources of power to logging and trending towards automation. However the huge chunks of history combined with the fact that there are often many specific items

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[3]Lewis Mumford, Technics and Civilization (New York: Harcourt, Brace and Co., 1938), pp. 107-263.

contained within each Mumford phase means that the classification, as it is, has limited value in understanding the minute changes that occur.

Technology in Logging

Chapter II described logging as a three phased activity governed by seasonal climatic conditions. Chapter III analyzed these phases and broke them down into specific work activities and outlined the items of technology applied to each activity. It further demonstrated that a linear work group can be analytically determined by examining the processes that occur in sequence and combining the workers who perform these activities. The workers in the linear group are those needed to carry out the activities necessary in the cutting and transporting of a tree to the mill site. It demonstrated that there are numerous parallel work units in each phase, numbering from several thousand in the cutting and hauloff phases to several dozen in the drive phase.

The Mumford classification has indicated the direction that technological change will take, i.e. tending toward automation or the replacement of labour in the production of goods and services. Applying this to logging, it would appear that the effects of technological change will bear directly on those work groups who are organized around the old technology. Since the work group is also the point of contact that any technological innovation has with a culture it would seem fruitful to focus on these groups and examine the effects that any new item of technology will have on them at the time of introduction.

At this level there are three possible effects that new technology can have on groups employed in the line production process. First, it can affect the number of activities to be carried out and thus affect the number of persons involved in the process. Second, it can rearrange the sequence in which the activities occur and thus force reorganization of the work group. Third, it may have no effect on the size or the organization of the groups into which it was introduced but, in a system such as logging involving many parallel work groups, it may affect the number of such groups.

This last possibility, the effects on the parallel work groups, appears to be somewhat spurious. In the first two cases the effect occurs at the time of introduction and in the group into which the new technology is introduced. However in this last case, the effects are not felt in the groups using the technology, but in those that are not, and perhaps not until some considerable time has elapsed. The reason for affecting parallel groups will probably be because of limits on the market or resource and, since new technology will often produce more, it will then reduce the need for as many groups. This is as much a result of limits on the market as it is of the new technology and if one extrapolates to an unlimited or expanding market or resource the same does not occur. Therefore the number of parallel groups will be dropped as an area of consideration as far as classification is concerned and attention will be focused on the other two, i.e. the size of the existing work group and the organization displayed at the time of introduction.

Focusing on the linear work group and its organization, and extrapolating to change -- no change at the time of introduction, there are four possible ways in which new items of technology can affect the work group as expressed by the following table.

TABLE 6

EFFECTS OF NEW TECHNOLOGY ON WORK GROUPS

Criterion	Effects			
Size of linear work group:	o	o	+	+
Organization of linear work group:	o	+	o	+

o indicates no change.

+ indicates change.

Restated, the limits of possible effects are:

1. No change in the size of the linear work group; no change in the organization of the linear work group. Since this technology will not affect either of the two criteria but will simply be a direct substitute for the technology already existing, it will be termed "substitute technology" to indicate this.

2. No change in the size of the linear work group; change in the organization of the work group. This type will be termed "reorganizational technology" to indicate its main effect.

3. A change in the size of the linear work group; no change in the organization. Since the effect of this type will bear on the number of workers, i.e. the mass, it will be termed "mass technology".

4. A change in the size of the linear work group; a change in the organization of the work group. Since this technology will affect both selected criteria it will be termed "pluralistic technology".

These four represent the limits of the possible effects that new technology can have on the work group, on the basis of the selected criteria, at the time of introduction. However further refinement is possible within these gross limits. Where the effect of the new technology will bear on the number of workers in the groups, i.e. in the case of mass technology and pluralistic technology, it is possible to develop sub-categories by giving direction to the changes that will occur.

Mass technology: Where the effects of the new technology is to reduce the number of persons involved in the linear work group the technology will be classified as "mass contractive" to indicate this direction.

Where the effect of the new technology is to increase the number of persons involved in the linear work group, the technology will be classified as "mass expansive" to indicate this direction.

Pluralistic technology: Where the effect of the new technology is to reduce the number of persons involved in the linear work group the technology will be classified as "pluralistic contractive".

Where the effect of the new technology is to increase the number of persons involved in the linear work group the technology will be classified as "pluralistic expansive".

Further refinement is also possible by concentrating on the degree of reorganization required. However, since this classification is being developed to be applied to a particular case study, it is unnecessary to refine the concepts more than is required by that particular case itself. The six categories so far developed will suffice for this.

Resistance to Technological Change

A large portion of Sociological and Anthropological literature deals with change and resistance to change. Technological change, as a series of events, has had limited treatment and then mostly to deal with cases where change was resisted and unsuccessful. However it appears that in some cases technological change has occurred with little resistance even, at times, when it has had disasterous effects on the groups employing the new technology, in long run terms. The above classification, which progresses from the simplest to the most complex in terms of its effects on the work group existing at the time of introduction, may be helpful in documenting resistance to technological change. This is particularly true in this case because, as was noted earlier, the work group here was the point of contact of the new technology with the culture, and resistance should therefore have first been generated at that point.

As a generally stated hypothesis it is felt that - *The resistance to technological change will increase directly with the effect it has on the linear work group at the time of introduction. Resistance will be lowest or non existent in the case of substitute technology and will be highest for pluralistic technology with varying degrees between.*

To test this hypothesis it is first necessary to distinguish between two types of resistance, non-structured resistance and structured resistance.

Non-structured resistance will be defined as resistance

limited to the level at which the technology was introduced. Operationally, in the case of the cutting phase of logging and as the work was organized under the conventional system, it will be individual resistance. The non-structured type consists of the setting and enforcement by the workers of a quota on production, stress between those using the new technology and those not using it, stress between the line unit and management, a general lessening of morale and possibly, in extreme cases, withdrawal from the production process.

Structured resistance will consist of action by groups organized for that purpose and, where such exists, union action as well. Formal resistance will therefore often result from the non-structured level resistance and simply represents a more formally organized method of generating and expressing it.. Structured resistance, where it occurs, will consist of work slowdowns, a rigid universal quota system, working to rule, and possibly strikes as an extreme measure. It will also be reflected in union demands for job security clauses in an attempt to increase the cost of technological change.

Conclusion

In this chapter a classification of types of technology based on the effects new technology has on the work group existing at the time of introduction, was developed. It is expected that this classification of technology will give some insight into how change proceeds, whom it affects, what its limits are, and what resistance there is to change and from what source. It is necessary to restate that this is a reconstructed case study, so that it is particularistic, and

all possible types of technology may not have yet been applied to logging, nor may all of the effects have yet occurred. The classification will be applied to the logging industry in the next several chapters and any specific qualifications applying to that industry will be noted there.

CHAPTER V

THE PROCESS OF MECHANIZATION

This chapter will trace the introduction of new items of technology into the logging industry as they have occurred since 1950 and extending to 1969. Specific items will be classified according to the system developed in Chapter IV. In addition unique characteristics that each item has as an individual item rather than as a member of a type or class will be outlined. It is felt that in at least two cases these unique characteristics, while not affecting the acceptability of new technology to the workers, nevertheless did affect the manner in which the new technology was introduced. Additional information, where available, will be given on the effect each item has had on employment opportunities and data from the files of the A.N.D. Company will be used to illustrate this.

Before turning to actual items of technology it is first necessary to restate a qualification applying to the classification developed in Chapter IV. That classification is based on *all* possible effects new technology can have on the selected criteria at the time of introduction. However when applying logical types to actual case studies one often discovers that not all the logical possibilities have occurred. This is also the case in logging. Of the six types of technology outlined only four have so far been introduced. The two missing types are reorganizational and mass contractive technologies. Both of these are theoretical possibilities but there is some doubt as to whether they are, in fact, practical possibilities. It is, for

example, difficult to think of an actual item of technology which, at the time of introduction, can force a reorganization of the existing work group without in any way affecting its linear size. The same practical consideration applies, in lesser degree, to mass contractive technology. In any event neither of these two have thus far occurred in logging and thus cannot be examined here.

The four selected items of technology which have been introduced into, or which have gained prominence in, logging since 1950 are, in order of discussion, the power or chainsaw; the truck; the skidder; and finally the slasher. A fifth item, the J5 Bombardier was also introduced, but it lies so close to trucking in its application and type that all the characteristics of the Bombardier are illustrated by the truck. Further the truck has survived to become the dominant carrying vehicle while the Bombardier has diminished in importance in recent years. Inclusion of the Bombardier would thus add no new dimension to the discussion of technology so it will not be included.

The chapter is separated into different parts, one for each item of technology introduced for a total of four separate units. Each item is discussed in the time sequence in which it occurred. It was felt that before going on to discuss resistance to technological change, in the next two chapters, it would be helpful to illustrate the dimensions of change, i.e. the total effect of the combination of these different items of technology. A fifth section, outlining the line production units under the mechanized system, has therefore been included and this section focuses on differences between the conventional logging system and the mechanized logging system.

PART I

THE POWER SAW

Introduction

The power or chain saw was introduced into the cutting phase of logging in 1954 and by 1958 it was used to cut eighty-seven percent of the total production. Unlike most other technological items the power saw did not appear first in one geographical area and then only gradually spread into others but it appears to have made its appearance in all divisions and in the operations of both paper companies at the same time. The reason for this probably lies in the fact that it was introduced by the workers themselves without aid or incentive from the two paper companies and was, in fact, the only technological innovation to be so introduced.

Table 7 outlines data on the total production for one paper company for the years 1955 - 1959 and illustrates the average number of cords produced per "cutting man day"[1] as well as the average earnings per cutter. Table 8 illustrates the number of cords cut by the buck saw, its percentage of the total production as well as the average earnings per cutting man day using that particular item. Table 9 illustrates the same data for the power saw.

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[1]The phrase "cutting man day" indicates that the data presented are for men actually engaged in cutting timber and does not include men engaged in other activities. The term "man day" includes all workers engaged in a specific project.

TABLE 7

TOTAL PRODUCTION, AVERAGE PER MAN DAY PRODUCTION, AVERAGE DAILY EARNINGS, FOR OPERATIONS OF A.N.D. CO. LTD.

Year	1955	1956	1957*	1958	1959
Total production	370,037	345,738		263,131	245,768
Percent of total	100	100		100	100
Cords per man day	1.72	1.91		2.11	2.17
Earnings per man day	10.54	12.83		15.09	15.69

TABLE 8

TOTAL BUCK SAW PRODUCTION, MAN DAY PRODUCTION AND EARNINGS (A.N.D. CO. LTD.)

Year	1955	1956	1957*	1958	1959
Number of cords	314,280	129,265		34,242	18,357
Percent of total	84.9	37.4		13.0	7.0
Cords per man day	1.68	1.59		1.63	1.50
Earnings per man day	10.22	10.58		12.12	11.47

TABLE 9

TOTAL POWER SAW PRODUCTION, MAN DAY PRODUCTION AND EARNINGS (A.N.D. CO. LTD)

Year	1955	1956	1957*	1958	1959
Number of cords	55,757	216,473		228,888	227,413
Percent of total	15.1	62.6		87.0	93.0
Cords per man day	2.11	2.16		2.21	2.26
Earnings per man day	12.82	14.43		15.59	16.20

* No data available
Source: A.N.D. Co. Ltd.

The tables indicate that over a four year period, 1955-1959, the power saw moved from being used in cutting only 15.1 percent of the total production to ninety-three percent of the total. The largest increase was in 1956 when it moved from 15.1 percent to 62.6 percent. These figures indicate that once the effectiveness of the new technology had been demonstrated there was a rapid movement towards its acceptance. However when one considers that this item was introduced and spread without benefit of company incentives the rapid dissemination is a fact that must be explained over and above criteria applying to that particular type of technology, i.e. by characteristics that apply to the power saw as a specific item of technology and not as a member of a class or type.

Individual Characteristics

The power saw, as a specific item of technology, had four distinctive characteristics which appear to have influenced the method of introduction and also its rapid dissemination throughout logging. The first of these is that it was relatively inexpensive to purchase. Second, it increased earnings. Third, it was portable into other sectors of the worker's own economy, and finally, all production functions affected by the new technology fell under the span of control of the individual worker himself. Each of these characteristics will be discussed in turn.

The power saw was purchased, usually on a time payment plan, from a group of salesmen who first appeared in the woods in 1954. The purchasing price ranged from approximately 170 to 300 dollars depending

on the type and the horsepower rating. If one compares this to the average earnings from logging of 776 dollars during the same period[2], then the purchase price represents roughly one third of the individual's income from that source alone. Sociologists have long felt that one of the barriers to rapid technological dissemination has been the relatively high cost of any new technology in comparison to the yearly income of the persons for whom it was intended[3]. The concept of "intermediate technology" is in part based on the necessity to keep costs near or below the yearly income of the persons who must purchase it[4]. The power saw fits this criteria rather well and it is doubtlessly one of the reasons for its introduction by the workers themselves.

When first introduced the power saw was utilized in the cutting phase for up to a period of three months each year. It had a life span of from three to five years depending on maintenance and the way in which it was used. Because it directly increased operating costs to the cutter it was necessary that it also increase returns to compensate. The Royal Commission (1960)[5] calculates an operating cost of .75 dollars per cord. Using this as a base and applying it to the information presented in Table 9 the average operating cost of the new technology over the old was 1.58 dollars per day. The average

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[2]Source: A.N.D. Company Limited.

[3]E. F. Schumacher. "How to help them help themselves" The Observer. August 29, 1965.

[4]E. F. Schumacher. "The need for an Intermediate Technology" The Nigerian Review. March 1967.

[5]Report of the Commission of Enquiry on the Logging Industry, 1960. (St. John's: Queen's Printer, 1960), p. 19.

increased returns were 2.60 dollars per day, large enough to cover the operating costs and give an additional return of 1.02 dollars per day, or the equivalent of about an eight percent increase in pay. But, since the cutter must still compensate for the original purchase price the increase of about twenty-five dollars per month, or about seventy-five dollars per cutting phase[6], is insufficient to cover this in one yearly cycle of logging and it would require from two to three years for the cutter to redeem the original capital investment. This, as noted above, was roughly equal to the minimum life span of the power saw.

A straight calculation of the increased returns from logging applied against the original investment does not indicate all the factors bearing on the purchase of the new technology and, as the following paragraph indicates, there is much more to be considered than just increased returns from the logging phase alone.

The third aspect of the power saw that influenced its method of introduction was its portability into other sectors of the workers economy. It was outlined in Chapter II that, from the point of view of the individual worker, the horse served a dual purpose having uses in both the cash and the non-cash sectors. This same criteria holds for the power saw as well. In the non-cash sector it was used to cut fire wood and then to junk it into the required length, to cut timber for boats, stages and even homes, and for rough carpentry work around

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[6]Calculated from data in Chapter II.

the home. In fact, the power saw was used in any type of activity where a rough wood cutting instrument was required. Thus a straight calculation of costs and return in the cash sector alone, as in the preceding paragraph, does not give an adequate indication of the overall importance of the power saw to the individual logger. However, it is difficult to give a cash value to the uses of the power saw in the non-cash sector, not only because it is non-cash, but also because there was a wide variation in the use of the power saw outside the cash sector. About all that can be said with any degree of accuracy is that the power saw appears to have been marginal in the cash sector alone but that its added use, or the potential for use, in the non-cash sector more than compensates for any potential losses in any one sector of the workers economy.

The final item or characteristic of the new technology that influenced its method of introduction was that, in its application, it was limited directly to those areas and functions directly within the span of control of the individual logger. In Chapter II, in outlining the three phases and the technology in each, it was noted that in the cutting phase all the functions, from cutting the tree to piling it, were carried out by one man only. Further since the power saw was limited to the cutting phase and did not spread its influence either backward or forward outside that particular phase, any worker who might, for the other reasons just outlined, be favourably disposed towards the new technology had no other worker to consider in the decisional process. He himself retained whatever profits the new

technology brought and he sustained any losses incurred. He could accept or reject the technology on his own initiative without having to convince others of its practicability and without having to consider any possible effects on them[7].

These four characteristics, the relatively low purchase price, the increased returns, the portability factor and finally the span of control are the four factors that appear to have had the greatest influence on the way in which the new technology was introduced. It must be restated that these characteristics apply only to the power saw as a specific item of technology and not to the type. They influenced the way in which it was introduced but did not influence its acceptability as a cutting tool on the job. To say that it did one would have to argue that if the power saw had been introduced directly by the companies themselves, which would effectively remove all of these four characteristics from consideration, then the new technology would have been resisted or rejected by the workers. This argument is not tenable on logical grounds but also, more importantly, on empirical grounds. Since 1962 the two paper companies have begun purchasing their own equipment and today own practically all the power saws in operation. In spite of this there has been no resistance from the workers to its use as a cutting instrument on the job.

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[7]While these four factors appear to have been the most important in the introduction of the power saw there may well have been other factors including possible psychological factors. However research was carried out many years after the introduction of the items in question and it was not possible to reconstruct completely the entire process and some potential factors could not be studied.

The Technological Type

The power saw, when first introduced, was used as direct replacement for only one item of the existing technology. It was used to perform only those functions previously performed by the buck saw. Diagram 3 indicates the functions carried out in the cutting phase and the technology used. It also indicates the functions in which the power saw was first used. From the diagram one can see that there is a direct and limited perception as between the uses of the old technology and the new, one being a replacement for the other in those, and only in those, functions. The other item in the cutter's technological kit, the axe, remained important for many years.

The diagram also indicates that the power saw did not affect the order in which the production functions were carried out in the cutting phase nor did it affect the sequence of these functions. Each was still carried out in the same order and to the same degree. In addition each cutter still remained an independent production unit carrying out all the necessary functions required. Therefore, the power saw, as an item of technology, since it did not affect the organization or the size of the linear unit is an example of substitute technology under the criteria outlined previously.

Supplementary Data

The introduction of the power saw lends supporting data to a decision made when attempting to compile a classification of technological types. In Chapter IV it was decided not to include possible

DIAGRAM 3

FUNCTIONS CARRIED OUT IN THE CUTTING PHASE AND TECHNOLOGY IN EACH

Functions	cut strip road	cut	delimb	junk into required length	pile
Conventional technology	buck saw and axe	buck saw	axe	buck saw	hand
With power saw	power saw and axe	power saw	axe	power saw	hand

effects on parallel work groups as an area of consideration because it was felt that worker displacement in these groups following technological change was as much a result of limited markets as it was of the new technology itself. Table 10 presents data supporting that decision.

TABLE 10

GROSS PRODUCTION AND EMPLOYMENT 1953 TO 1958

Year	1953	1954	1955	1956	1957*	1958
Total cords	298,539	316,868	370,037	345,738		263,131
Number persons	6,084	6,172	6,996	6,727		4,146

* No data available.

Source - A.N.D. Company Ltd.

Table 10 outlines data on the production and employment figures for the woods department of A.N.D. Company for the years 1953-1958. It demonstrates that following the reorganization in 1957 both the output and the employment were reduced. However it also demonstrates that prior to 1957 both the total output and the number of employees increased except for 1956 when both fell slightly. The table indicates, by means of the increased cuts, that there was an expanding market, and the effects of increased man/day production was absorbed by increased inventory so that there was no worker displacement in parallel work groups. However, following the 1957 reorganization there was a restoration of the limits on the market which was then reflected in displacement of parallel work groups. The data indicate that with an expanding or unlimited market the effects of technological change will

not be felt in parallel work groups or, at least, in the displacement of workers from these groups.

Conclusion

The power saw, an example of substitute technology, was introduced into logging between 1954 and 1959. It was introduced by the workers themselves because of several characteristics that apply to that particular item of technology and not to the type. These were, the portability factor, the increased returns, the relatively low purchase price, and effects were within the span of control of the individual logger. Although the number of workers in logging continued to increase after the power saw had been introduced a reorganization of the A.N.D. Company in 1957 resulted in the displacement of workers from parallel work groups. The drop in employment was from 6,084 men in 1953[8] prior to the introduction of the new technology to 4,146[9] men in 1958 when that item was used to cut eighty-seven percent of the total production of the A.N.D. Company.

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[8]From Table 10.

[9]Ibid.

PART II

TRUCKING

Pressures for Change

Of all the new technological innovations to appear in logging since 1950 trucking has taken the longest to reach its full potential and to spread into all geographical areas. It was first introduced into the Bowaters operations in the Glenwood Division in the late 1940's but after a short and apparently unsuccessful debut it disappeared until the early 1950's when it again made a reappearance. The long period of adoption and the slow pace at which it spread throughout the logging operations was a product of the pressures which first led to its introduction.

It was noted in Chapter III that under the conventional logging system the hauloff was probably the phase most influenced by, and dependant on, climatic conditions. In a good hauling year wood was transported without too much difficulty but under poor hauling conditions it was a long and arduous process and sometimes large amounts of wood had to be left in the forest until the following year. The short hauloff phase placed pressure backward into the cutting phase and forced it to adapt to the pressures bearing on the hauloff phase. Also, under the conventional system, there was a rather rigid limit to the distance that timber could be transported economically. During the earlier periods the distance factor was overcome by either concentrating on the timber along the river valleys and the surrounding slopes or, in some areas, by double hauling, first by horse and sled

and then by tractor train. However even this system had fairly rigid distance limits and it was still subject to the climatic factor. The combination of these two factors, distance and climate, resulted in the experimentation with trucking and it was in the areas experiencing distance as the dominant factor that it was first introduced. Only gradually did it spread into geographical areas where the hauloff could be accomplished using the conventional method.

Method of Introduction

In Part I the introduction of the power saw was traced and it was noted that it was introduced by the men themselves. One of the factors bearing on this was that with the power saw all functions affected came under the span of control of the individual worker himself. However this does not hold for the truck. In addition to requiring expensive gravel roads on which to travel, it required that the wood first be centralized in one area ("yarded") using the conventional system and it also required large inputs of hand labour in loading. All of these factors lie outside the span of control of the individual worker.

Since the hauloff covered only a short period of the year and was still dependant on the traditional hauloff period so that it could not be extended greatly, it meant that any equipment purchased for this purpose by the paper companies would be lying idle for a great portion of the yearly cycle. To overcome this and to displace the diseconomies associated with seasonal use outside the logging system the companies attempted to contract as many trucks as possible

from private owner operators. Thus the introduction of the truck came about through the efforts of both the paper companies and private owner-operators some of whom were loggers themselves.

In the initial stages of introduction the trucks were contracted from private owner-operators many of whom already used trucks to haul freight, firewood and for small construction jobs. In answer to the demand for trucks in hauling timber an additional group of owner-operators sprang up, usually in the communities utilizing logging as the prime source of cash income. Many of these men had never worked in the woods before and the trucks therefore brought an entirely new group of workers into logging. The development of trucking closely paralleled the growth of the construction industry, particularly the construction of the Trans Canada Highway, so that the trucks were used in this sector when not hauling wood. The truck was probably economically marginal in any one area but the combination of work in different cash sectors made it viable overall. The portability factor which was important in both the use of horses in logging and in the introduction of the power saw was thus also important in the introduction of trucking.

Trucking Classified

Trucking involved a whole new set of production functions added in to those already existing under the conventional system. The wood was prehauled ("yarded") by horse and tractor to a central point on or near a gravel road. It was then reloaded into trucks for transport to a river system, direct to the mill or, in some cases, to

DIAGRAM 4

COMPARISON FUNCTIONS AND TECHNOLOGY IN HAULOFF PHASE
BEFORE AND AFTER INTRODUCTION OF TRUCKING

BEFORE TRUCKING

Functions	load	haul	unload			
Technology	hand	horse tractor sled	hand			

AFTER TRUCKING

Functions	load	haul	unload	load	haul	unload
Technology	hand	horse tractor	hand	hand	truck	mechanized dump

a central railway terminal. Diagram 4 illustrates both the new and the old system and outlines the functions and technology in each. The top portion represents the conventional system and the two parts together represent the system that evolved under trucking. From the diagram it is evident that the organization of the traditional work group did not change but that the size of the linear unit was expanded by simply adding in the new production functions and workers to the end of the traditional system. Trucking, since it did not affect the organization of the traditional work unit but did affect its size by adding in new workers is an example of mass expansive technology.

Effects on Employment

It has taken more than a generation for trucking to develop into the predominant method of transporting pulpwood at least part of the way to the mill site. It is therefore difficult to isolate it from other factors and other technologies which may have influenced the number of workers in the overall production system. However the period 1958 to 1962 appears to be best for isolation purposes and data for that period is presented in Table 11. During the period covered by the above table the amount of wood trucked by A.N.D. increased from 49,000 cords in 1958 to 87,000 cords in 1962.

TABLE 11

PRODUCTION AND EMPLOYMENT TOTALS 1958 - 1962 FOR A.N.D. COMPANY LTD.

Year	1958	1959	1960	1961	1962
Amount cut	263,131	244,787	318,074	316,479	229,428
Men employed	4,146	4,419	4,431	3,918	3,590

Source: A.N.D. Company Ltd.

Table 11 illustrates that there was a slight increase in the number of workers employed until 1960 when the process began to reverse. The increase until 1960 was probably caused in part by increased trucking and while it was not very great, when one considers that during the same period the power saw moved from eighty-seven percent to ninety-seven percent acceptability and that the per man day production increased from 2.11 to about 2.20 cords thereby causing displacement in parallel groups, the increase is greater than these figures reveal. Since that time the amount of wood trucked either direct to the mill or at some intermediate point has greatly increased and although no accurate figures are available a company official estimated that about ninety-five percent of the timber is trucked either direct or at some intermediate point today.

Change in Ownership

The duality of purpose of the owner-operated trucks, while of importance while trucking was still in its infancy, was eventually to be a factor in the virtual disappearance of the vehicle from pulp wood operations. Since the trucks had to serve many tasks they could not be specifically designed for any one. Specifically this required that there be heavy inputs of hand labour in loading these trucks and as the labour rates increased the viability of this non-specialized equipment decreased. In addition, because many of the owner-operators found it difficult to generate the amount of capital required to purchase new equipment, used trucks were often purchased and these were subject to frequent breakdowns which left the expensive hand labour

under-utilized. The trucks were also used in the construction field which by this time had become the preferred field. As the wood trucking period was extended back into the fall and even into the summer the companies found themselves bidding against the construction companies for use of the equipment and could never be sure, from one year to the next, whether sufficient trucks could be contracted to transport all the timber.

To overcome some of these difficulties the paper companies instituted a subsidization plan to encourage as many of their own contractors to purchase equipment, particularly of a specialized nature which would require less hand labour in loading. The preferred item was a tandem type vehicle equipped with several spare detachable pallets. The pallets were dropped in rotation at key locations and the expensive truck was kept in continuous operation transporting each pallet in turn as it was loaded. However the specialization meant that the portability of these vehicles was lost and thus the owners were dependent directly on the paper companies for their incomes. Few owner-operators purchased this equipment and even some contractors, who had an advantage through the incentive plan, tried to retain as much unspecialized equipment as they could. Faced with this dilemma the paper companies decided to move directly into trucking themselves and from about 1962 on have purchased an increasingly high percentage of the equipment until today most of the trucks operating in the woods divisions of both paper companies, particularly the larger specialized variety, are company owned and operated.

The Portability Factor

Trucking was the last technological change of the four outlined earlier in which the workers played any direct part in the introduction into logging. Previous to that there were three items, the horse, the power saw and the truck which the workers either introduced directly or cooperated with the paper companies in their efforts to use them. All three had one characteristic which appears to have been the key reason for that particular method of ownership and that was portability. Although, because of the short seasonal nature of logging, all of these items may have been rather marginal for that activity alone, the combination of uses in both logging and in either the non-cash sector or other cash sectors available to the worker made them viable overall. The criteria of portability appears to have been so important to the workers that it was only items having this characteristic that they would themselves purchase. If the item ceased to have this characteristic, as did the truck, then the workers simply ceased purchasing it and either dropped out of logging altogether or became drivers for the companies.

Conclusions

Trucking, an example of mass expansive technology, was introduced into logging in the early 1950's in selected geographical areas and gradually spread into other areas. When first introduced it was through a combination of initiative of the paper companies and the individual owner operators. One fact - portability - explains the reason why workers were able to introduce the technology. When the

companies placed demands for specialization which would reduce this factor many owner-operators moved out of logging. Initially trucking, because it was mass expansive technology, probably caused a small increase in the number of workers in the overall production system but this was overcome by the other items of technology, particularly the power saw, which continued to reduce work opportunities.

PART III

THE WHEELED SKIDDER

Pressures for Change

The wheeled skidder, a four wheel drive farm tractor type apparatus capable of dragging from six to a dozen full length trees from the cutting area to a central road, was introduced primarily as a result of pressures generated by the movement towards trucking. When the paper companies decided to move directly into trucking themselves they were immediately faced with a dilemma. Either purchase enough equipment to transport the timber in the traditional period or else purchase less equipment and compensate by extending the trucking season as much as possible. The preferred solution was obviously the latter because, in addition to reducing the original capital investment, an extended trucking season would overcome the necessity to keep expensive equipment in storage for long periods. However to extend the hauling season it was necessary to keep logging camps open for longer periods, to keep scalers and other staff personnel on the payroll, thus increasing costs.

Other factors from other mechanization already introduced also entered the decisional process. The introduction of the power saw and the subsequent increase in man-day production freed the paper companies from the heavy dependence on a large influx of seasonal labour in the fall cutting phase. Since scalers and other personnel had to be maintained on payroll in any event, and since the camps had to remain open, it was reasoned that cutting should also be a year

around activity. The power saw with its increased production made this a practical possibility and the companies opted to rely on a skilled staff of year around workers rather than the large seasonal influx of largely unskilled workers.

We thus have a series of internal pressures generated by the introduction of trucking. On the other hand there is a series of results or consequences following the introduction of the power saw which gave the potential to the cutting phase to adapt to the new internal pressures generated by the hauling phase. The link between the two, or the technological item necessary to meet the requirements of year around operation, was a machine which could transport the timber from the area where it was cut, i.e. the stump, to the central road area. The technology must be capable of use year around, i.e. it could not be dependent on seasonal climatic conditions such as snow or ice but must be capable of operation both in winter in several feet of snow and in summer on bare ground.

The technological item that met the demands outlined was the wheeled skidder. It was introduced into the Glenwood operations of the Bowaters Company in 1962 and by 1964 that company had ninety machines in operation. The A.N.D. Company was a little later in following the lead set by Bowaters but by 1964 that company[10] (now Price Nfld. Ltd.) had twenty-six machines in operation. By 1968 this had expanded to 142 machines and in 1969 Price Nfld. Ltd. had 158 skidders working in their operations.

[10]In 1962 Price Brothers & Company, Limited, of Montreal gained control of A.N.D. Co. Ltd., and it is now part of the Price group of companies and known as Price Nfld. Ltd.

Classification Type

Diagram 5 illustrates the activities or functions that were carried out before the introduction of the skidder and the sequence of production functions that followed its introduction. The skidder, in effect, combined the two distinct phases of cutting and hauloff into one and extended it beyond the limits imposed on the conventional system into a year round activity. In reorganizing the sequence in which the production functions occurred it also forced a reorganization of the work patterns and the work unit that performed them. Workers were added into the linear process to perform specific functions and thus because it both reorganizes and expands the traditional work unit the wheeled skidder is an example of pluralistic expansive technology.

As Diagram 5 illustrates the skidder forced a complete reorganization of the production functions around the new central item of technology the skidder itself. It had a five man team organized around it. Two men ("fellers") using power saws cut the timber and removed most of the branches. The skidder operator then attached the full length timber to the rear of his machine and dragged it to the truck road. Here two men ("buckers") again using power saws junked the timber into the required length and piled it, by hand, onto truck pallets dropped there for that purpose. It was then trucked to the mill or to some other point for transshipment. Using this method a tree could be cut in the forest in the morning and that night it could be undergoing processing in the mill. Under the conventional system the same process would require eight to ten months to complete.

DIAGRAM 5

COMPARISON FUNCTIONS AND TECHNOLOGY BEFORE AND AFTER SKIDDER

BEFORE THE SKIDDER

Function	strip road	cut	de-limb	junk up	pile	load	haul	un-load	load
Technology	power saw	power saw	power saw axe	power saw	hand	hand	horse tractor	hand	hand

AFTER THE SKIDDER

Function	cut	delimb	haul	junk up	load	haul	unload
Technology	power saw	power saw axe	skidder	power saw	hand	truck	mechanical dump

The wheeled skidder brought profound changes in the cutting and hauling of pulpwood. Whereas previously one person carried out all the functions in the cutting phase he now performed only two. Since the skidder had two fellers feeding it parallel cooperation was forced between these two men. At the other end parallel cooperation was forced between the two buckers taking the timber away from the skidder. Linear cooperation between the two fellers and the skidder operator, as well as between the two buckers and the skidder operator, was also forced and the entire production of the unit often depended on how well these men co-operated with each other. As well, for the first time, there is dependence of one group of men on another as, since there is no longer the individual man as production unit, the two buckers were completely dependent on the two fellers for their daily production rate. The production and transportation of pulp wood is now a specialized assembly line process with each individual unit dependent on the other and linked together by the demands of the skidder. The skidder has produced a set of specialized roles, a new order of social relationships, a new means of interaction, and a dependence of one portion of the production unit on the portion existing immediately before it. These points are discussed in detail in the following chapter because, although the skidder may have increased the effect, they are products not of that particular item of technology but are products of that particular type of technology - pluralistic expansive technology.

Effects on Employment

The production by a complete skidder crew varied greatly depending on terrain and the length of the haul but it usually ranges between fifteen and thirty cords per unit per day, i.e. three to six cords per man. This compares to a production of 2.18 cords per cutting man day before the introduction of the skidder in 1962[11]. In 1962 before the introduction of the skidder there were 3,590 men who found employment with Price Nfld., by 1968 this had been reduced to 1,647 for the same company[12]. Some of this reduction is no doubt caused by greater expertise in the handling of the power saw and by utilizing larger trucks thereby reducing the number required, but there is little doubt that the major part of this displacement was caused by increased production as a result of the introduction of the wheeled skidder.

Supplementary Data

The wheeled skidder illustrates one further point, and that is the change in emphasis that has occurred since the introduction of trucking. Under the conventional system logging was governed by seasonal climatic conditions and both loggers and management were forced to utilize natural conditions to best advantage. When nature did not cooperate there was little that could be done about it. However with the introduction of trucking and particularly the wheeled skidder the emphasis has changed from utilizing natural or climatic

[11]Source: A.N.D. Company Ltd.

[12]Source: Price Nfld. Ltd.

conditions to best advantage to attempting to overcome the limits placed by these natural conditions on the production system. Logging no longer has three phases, it is no longer governed by the seasons, and with the conquering of these natural limits logging has also moved away from affinity with other activities, such as fishing, still under the control of natural conditions.

PART IV

THE SLASHER

Pressures for Change

It was noted in Chapter III that in logging the technology in use at any one time aside from being limited by the discovery aspect, is also a product of the demand at the market for a particular semi finished item which required that certain production functions must be carried out. Second it was limited by environmental pressures which largely determined where these processes could best be carried out. Third in combination with the two of these the technology used in any part of the process is also influenced by the technology in use in another part. The limits of the technology in any one part means that it is simpler or easier to carry out certain production processes before or after that particular process is met. This means that the technology in use at any one time is partly determined by the order in which the production functions occur. However the introduction of the wheeled skidder completely reorganized these functions so that technological change in the reorganized areas may now be possible. Since each skidder has two buckers at road side for junking up the timber it is possible, by collecting the buckers from many such units together, to replace them all with one item of technology the slasher.

There are two types of slasher in use today. One operates in a central area and the full length timber is trucked directly to it. It then cuts the timber into the required length and either reloads it onto trucks, onto railway flatcars, or dumps it directly into the river.

The second type operates in the cutting area. It moves along the gravel road picking up and slashing the precut timber and loading it directly into specially designed trucks. The central type slasher was the first to be introduced but the second type is now becoming more prevalent particularly in the operations of Price Nfld. Ltd. A second distinction is that the central type skidder requires the introduction of a technological kit with it. Since the timber must be loaded full length onto the trucks and then offloaded at the slasher site, and it is too difficult for hand loading, this type is introduced along with two other technological items which specialize in these functions. The fact that the mobile skidder does not have this requirement probably is part of the reason that it is becoming more popular.

Classification Type

Diagram 6 outlines the production functions as they were carried out before and after the introduction of the slasher and the technology involved in each. The order of the functions illustrated for the post-slasher period is based on the centralized type operation since this was the first type introduced. It illustrates that the production functions have again been reordered as the "junking-up" activity follows rather than preceeds the trucking activity as in the pre-slashing era. It also demonstrates that there is a reduction in the number of workers involved in the linear process as the two buckers organized around each skidder has been replaced. Thus this is again a form of substitution but in this case rather than just replacing technology with technology as in the case of the power saw the point of

DIAGRAM 6

COMPARISON FUNCTIONS AND TECHNOLOGY BEFORE AND AFTER SLASHER

PRODUCTION FUNCTIONS BEFORE THE SLASHER

Functions	haul	junk up	load	haul
Technology	skidder	power saw	hand	truck

PRODUCTION FUNCTIONS AFTER THE SLASHER

Functions	haul	load	haul	unload	junk up	into river or reload train or truck
Technology	skidder	loader	truck	loader	slasher	slasher

the new technology is to replace men. Thus the slasher, since it reorganizes the work group by reordering the production functions and because it reduces the number of men in the linear process is an example of pluralistic contractive technology.

Effect on Employment

The full impact of the slasher has not yet been felt and thus gross statistics do not reveal its full impact. The slasher has not yet replaced all buckers, although there is little doubt that it eventually will. It was introduced into one area experimentally and, as yet, has not had enough time to spread into all areas. However the full eventual impact can be calculated from data already given. The capacity of the slasher unit is about 150 cords per nine hour shift. It operates on two shifts per day for a total production of about 300 cords. (This can easily be expanded by adding in another shift). At this rate it can handle the output of between ten and fifteen skidder units thus replacing between twenty and thirty buckers for each slasher introduced. It would therefore require between ten and fifteen slashers to take the output of the 158 skidders presently operated by Price Nfld. Ltd., and the total displacement would be about 316 buckers. Similarly using the same data for Bowaters operations the slasher, if it were to replace all buckers in the operations of both paper companies the total displacement would be in the order of about 800 men.

PART V

THE MECHANIZED SYSTEM

Diagram 2 page 57 Chapter III outlines the production functions and the order in which they occur as well as the technology for the conventional logging system. Diagram 7 illustrates the same data for the mechanized system. From comparison of these two diagrams it is obvious that the production and transportation of pulp wood under the mechanized system is a completely new and different system than that used in the conventional method. First, the production functions occur in different order. Second, some functions occuring under the conventional system, such as cutting the strip road, are no longer necessary under the mechanical system. Third, several of the functions occuring under the conventional system are combined and performed as one under the mechanical system. Fourth, the same item of technology, such as the power saw, is used in performing several functions under the mechanized system and the axe, used as a cutting aid in the conventional system, has disappeared. Finally, the three phases of the conventional system are no longer evident in the mechanized system. All of these changes have occurred within the span of about fifteen years and there are still many loggers working today who have worked in both systems.

The disappearance of the seasonal nature of logging is probably the most profound change that has occurred in spite of the importance of the others mentioned above. Table 3 (Chapter II page 27) outlines data for employees at the end of each month for the conventional

DIAGRAM 7

THE ACTIVITIES AND TECHNOLOGY IN MECHANIZED PULPWOOD PRODUCTION

Activities	cut	delimb	haul	load	haul	unload load	junk up	into river rail flatcar or truck
Technology	power	power	skidder	mecha-nical loader	truck	mecha-nical unloader	slasher	slasher

system. Table 12 page 106 does the same for the mechanized system. The graphs underneath both of these are reproductions of these tables and while comparable for trends are not comparable for gross figures since they are not drawn to the same scale. However, comparing these two graphs and concentrating only on trends, it is evident that under the mechanized system the bulk of work is done in the months from May until December. There is then a short break for the festive season of Christmas and production resumes and continues until the spring breakup occurring in late March. This compares with three distinctive peaks under the conventional system each of which corresponds with a particular logging phase.

Comparing the two graphs and concentrating on the period of minimum employment one finds that both systems have a rather prolonged period in the spring as a result of the breakup of rivers and the consequent flooding as well as the havoc wrought on gravel surface roads during this period. The conventional system also has a dip in late summer which precedes the cutting season and is preparatory to the large influx of men into the cutting phase. This feature is not paralleled by the mechanized system. Both systems again display a dip in December which, under the conventional system marked the end of the cutting phase and was preparatory to the hauloff. However under the mechanized system this is simply the marking of a festive occasion and is one of the few hangovers from the conventional system and one which will probably disappear in time. These dips graphically display the changes that have occurred in the traditional phases and the consequent high and low activity at different periods of the year.

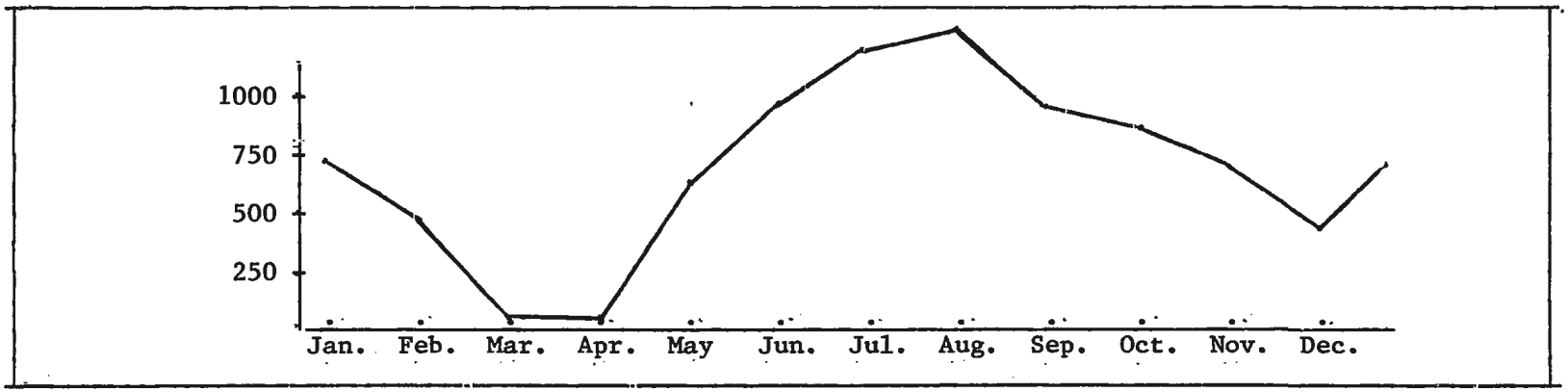
TABLE 12

NUMBER OF EMPLOYEES AT END OF EACH MONTH (1969)

Month	Employees
January	745
February	466
March	39
April	35
May	634
June	966
July	1,034
August	1,052
September	958
October	840
November	729
December	391

GRAPH 2

NUMBER OF EMPLOYEES AT END OF EACH MONTH (1969)



Source: Table 12 above.

Turning now to the information presented in the two tables and concentrating, not on trends, but on absolute figures the peak employment under the conventional system occurred in the cutting phase in September and October and peaked at 2286 men for Price Nfld. Ltd. The peak in the mechanized system occurs in July and August and is 1,052 men, or less than half those employed in the conventional system for the same company. This graphically illustrates not only the extending of the different phases throughout the summer period but the effect that the new employment has had on labour requirements reducing them by more than half in peak periods. Further the extending of the cutting and hauling period means that it is no longer seasonally fitted to correspond to the peaks and dips in the fishery and that the demands for workers who will remain for longer periods has eliminated many of them from the production system. The absolute figures also reveal that under the mechanized system the period of little employment has substantially fewer persons working than under the conventional system. This is a result of increased specialization. It was noted earlier that in order to retain its skilled help on tap the companies often had make work projects going in the off season. However under the mechanized system this is no longer necessary since a skilled worker can work for a period of six to ten months if he so requires, and since the camps no longer move from phase to phase there is no preparatory work that must be done, i.e. no moving from the line to the staff functions for the skilled personnel but they are retained in the job for which they were hired.

These are just a few of the differences that have occurred in logging since the beginning of the mechanization period. Many others have occurred including changes in the organization of the central office, change in the organization of the divisional offices, and changes in the logging camps themselves. These will be outlined in Chapter VIII but those noted here are intended to give an overview of the production system and indicate changes which may have influenced the makeup of the labour force, or changes which may have influenced the day to day activity on the job both of which may have contributed to resistance to technological change from the workers themselves, the subject of the next two chapters.

Conclusions

This chapter has traced the process of mechanization as it has occurred in the forest industry of Newfoundland. As outlined each new item, with the possible exception of the power saw, had its causes and each in turn then became a cause for new technological change. With the exception of the power saw each new technological item set up internal pressures on other functions, often in other phases, to bring them in line with demands from the new technology. Trucking in the hauloff phase extended its influence backwards in the system and forced the prehaul (yarding) function to adapt. A change in the prehaul area produced an entirely new order of production functions and permitted experimentation with replacement technology.

Reexamining the whole process it is evident that the power saw was probably, if not the cause, then certainly the base on which all

new technologies depended. Without the increased production of the power saw the companies would have remained dependent on a large influx of seasonal labour in the cutting phase. This labour could only have come from the fishery and then only in the fall. Without this dependence on the fishery new technologies which demanded year around activity and even shift work became feasible. Thus change in one area and at one level ultimately begets change in another area and at another level until a completely new production system appears in place of the old.

The original items of the new technology, the power saw and the truck were introduced either by the men themselves or by a combination of the men and company incentives. The main factor for this method of introduction was found to be the portability factor which made technology which was marginal in any one area viable overall.

Each specific item of technology has been fitted into the class or type to which it belongs. These are: substitute technology - the power saw; mass expansive technology - the truck; pluralistic expansive technology - the skidder; and pluralistic contractive technology - the slasher. Each of these types will be re-examined in the following two chapters with concentration on which types generate the greatest resistance to technological change.

Finally data on the displacement of workers from the system following each new type of technology has been presented. It was found that all technologies, with the exception of mass expansive technology, has displaced loggers but in most cases this has occurred

in parallel work groups. The only example of worker displacement in the work group in which the new technology was used was in the case of pluralistic contractive technology which, although the process is incomplete, probably has the potential to displace about 800 buckers from the system. At present the combination of the different technologies has displaced 4,377 persons in the woods department of Price Nfld. Ltd., between 1953 and 1968[13]. This represents about seventy-three percent of the total employment in 1953. For both paper companies this is a total drop from about 16,000 in 1953 to about 4,200 in 1968 with a total displacement of about 12,000 persons.

[13]Calculated from data presented in Chapter II for A.N.D. Company Ltd., and Price Nfld. Ltd., employment totals for 1968.

CHAPTER VI

NON-STRUCTURED RESISTANCE TO TECHNOLOGICAL CHANGE

Non-structured resistance to technological change is that type of resistance limited to the level at which the new technology is introduced. Operationally this would mean that, in the case of the power saw, the resistance would originate from, and be limited to, the cutting phase of logging. The reason for this limitation is that the resistance at this period is not formally structured as, for example, through union policy but it can, and often does, finally result in action through a formalized structure. That particular aspect is examined in the following chapter. Here, however, examination is limited to the origins and development of resistance in the individual work group. Non-structured resistance will consist of (again operationally) the setting and enforcement of group quotas at the level at which the new technology is used. In this way different quotas may exist in each work group using the same technology which certainly would not be the case if it were formally structured. It may also result in stress or conflict between those units using the new technology and those not using it; possible stress or conflict between the line production unit and management over the uses and productivity of the new technology. All of these could result in a general overall lessening of morale and possibly, in extreme cases, individual or group withdrawal from the production process.

Each of the four types of technology outlined in the previous chapter will be examined from the point of view just noted. This

however involves a change in technique from that followed in the preceding chapters. There data from the two paper companies as well as from published and unpublished sources has been heavily relied upon. However the paucity of such data, particularly from the historical and organizational viewpoint, has made it necessary to supplement these sources with information collected from individuals who have had a long career in the industry. In this chapter the point of emphasis shifts from trends in the industry to the reaction of the individual logger to such trends and changes. The technique used in collecting this data has been the open ended interview which, it was felt, would give greater opportunity in exploring new areas than would the more formally structured questionnaires. The response to a pre test of a mailed questionnaire was not sufficient to make it statistically valid and since the paucity of basic information, noted above, already placed the research in the exploratory category, it was decided to continue with this method. Therefore where resistance occurs the research is limited to outlining its sources and its development and no attempt is made to detail its absolute limits or dimensions other than to note whether it was a general or widespread phenomena. The alternative to this approach would be to limit research to areas already known or assumed and it was felt that before that becomes a practical reality a great deal more basic information about the whole industry must be made available so that precise testable hypothesis can be formulated before going into the field.

PART I

SUBSTITUTE TECHNOLOGY

Substitute technology has been defined as the type which does not affect either the size of the linear work group or its organization and both of these are the same both before and after the introduction of the new technology. In most cases this type consists in simply replacing a tool or method of power with another tool or method of power as in the substitution of mechanical for muscle power. The previous chapter has outlined why the power saw fits this criteria and has given particularistic data on its introduction.

In collecting data for this section the researcher was concerned with possible resistance at the non-structured level only and to do this he first solicited information from two contractors, one retired and one still active, who had a total of ninety men in their operations. Neither could remember or give examples of men who had not, in the end, used the power saw. When asked whether they were aware of men who had expressed displeasure with the power saw or a reluctance to use it the only example that could be given was in the first year of its operation.

> Well boy, first when it came in, that first year, there was a lot of cracks made about it. But the same fellows had power saws the next year themselves. They were only kidding anyway. You get a lot of that in the woods!

The above quotation illustrates that derision against those using the new technology was expressed at first. This is probably a method of separating them from the group and possibly forms the basis of group

solidarity against deviants. However when the value of the new technology had been demonstrated even the "kidders" accepted it. It is possible that the negative aspects of something new are the first to be noticed as in the fairly common statement "it will never work here" and the kidding and ridicule is used to establish a base for rejection of the new item should the need arise and is therefore a strategy and is not an indication of positive or negative feelings towards the new item.

When asked whether there were any men in the two camps who did not finally use the power saw the following answer was received.

> No boy, I think that after about three years everyone in my camp had one. Of course some of them got it faster than the others but I don't think you could say anyone was against it. Some didn't get it because they didn't have the money to buy it right away. I think Uncle[1] Max[2] was about the last. He never did buy one himself but he used his young fellow's when he could get it because he was getting up (old) and it wouldn't pay him to buy one for just a short while.

The last quote indicates that age may have been a factor in acceptability but on checking this against data on other older men there was no indication that this was so. In the case of the man mentioned, above and many others as well, the fact that they would not be going back into the woods much longer had removed the portability factor from the new technology and they therefore could not justify

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[1]The term "Uncle" is an honorary term applied to older men. In this context it does not indicate kinship.

[2]All names given in quotes throughout this chapter are pseudonyms.

the added expenditure. This indicates that there was a lot more rationality in the purchase of new items than one would at first suspect. This particular case is not rejection of the technology *per se*, but simply a difficulty caused by its method of introduction. Uncle Max did use the power saw so there was certainly no resistance to its use.

The above data illustrates that there was no resistance to the use of the power saw in the two camps studied. However it was felt that these two camps could have been selective in the men that they employed and thus may have had only acceptors. It was therefore decided to examine other criteria and since the entire universe could not be studied it was decided to concentrate on a specific division. Three persons familiar with the operation of the division were asked to name the twenty largest cutters during that period. The rationale for this was that since the largest cutters, under the conventional system, were those receiving the greatest reward it would likely be those persons who would resist the new technology more than others. The reputational basis as a technique of selection was chosen because a large or "big" cutter was a prestigious figure and was well known throughout the district. How well known is demonstrated by the fact that of the possible total of sixty men only twenty-six were actually named, indicating wide spread agreement on who the big cutters actually were. When checked against the time at which they first started using the power saw the following figures were obtained. Four used the power saw in its first year of operation, thirteen in the second year, eight

in the third year, and one in the fourth year. This was very close to the acceptability rate by all loggers outlined in Chapter V and since there was no significant difference amongst this sample the matter was not pursued further.

As an alternative to the above the researcher felt that since the greatest percentage of movement towards the power saw came before 1958 (approximately seventy percent) could not those who did not accept it until later be considered as resisting it? The age factor, or closeness to withdrawal from logging, was also a factor here but even more important was the fact that many of the men who were late acceptors were so because they were unable to generate the capital or credit necessary to purchase a power saw earlier. In discussions with a salesman it was established that, since most power saws were purchased partly or wholly on credit, the salesman selected those with the best credit rating (determined by a persons overall reliability i.e. reputational reliability equals credit potential) and left others until later. The method of introduction, by the workers themselves, actually slowed the process down somewhat by making it difficult for some loggers to generate the capital or credit necessary to purchase the technology. If the power saws had been introduced by the companies themselves its acceptable rate may have been more spectacular than it actually was.

In focusing on the slow acceptors several cases of individual resistance were found but all of these were based on characteristics that could not be generalized to the entire population. An example of

this was the case of a logger who had a fear of, or an aversion to, loud noises. He had actually given up fishing for this reason and when the power saw became predominant in the woods he also dropped out of logging. However cases such as these are based on specific unique characteristics applying only to that individual and have no effect on the overall acceptance of a new technology by an entire population who do not have that particular characteristic.

On the basis of the foregoing the researcher was unable to find any non-structured resistance to the use of the power saw in the cutting phase of logging which could be generalized to the entire population or even to a sizable group within it. Resistance on unique individual factors, as above, was found in a few cases. It was also found that the method of introduction, by the workers themselves, possibly slowed down the acceptance rate somewhat, but this had nothing to do with inherent characteristics of the technology item or type itself. Therefore, in logging, the introduction of a specific item of substitute technology encountered no resistance.

PART II

MASS EXPANSIVE TECHNOLOGY

Mass expansive technology is that type of technology which affects the size of the linear work group by expanding it but in so doing it does not affect the organization of the work group existing at the time of introduction. Trucking has been shown to be an example of this type of technology and particularistic data on its introduction were given in the previous chapter and it is here intended to concentrate on possible worker resistance to it. It should be noted that little interest was shown in the truckers themselves as a group, since, as already noted, they comprised an entirely new group in logging but interest was focused on the reaction of cutters and, more importantly, of loggers involved in the traditional hauloff to see what effects the trucks had on their traditional activities.

The researcher was unable to find any well defined resistance or negative reaction from the cutters themselves to the trucks and the following quote is representative of the general answer received to questions directed to this group.

> Well the trucks didn't make any difference to me. I went to work in the morning and I didn't see them until I came out of the woods again. Matter of fact they made things easier for us fellows because we could get a ride to work instead of walking.

This man was a cutter and what he is saying in effect is that the trucks were removed from the cutting phase and did not push any effects back into that phase. The cutter was only linked to the

trucks through the traditional hauloff which at that time was carried out in winter while cutting occurred mostly in the fall so that there was often a time as well as spacial distance between the two phases.

The hauloff phase, or what may be better termed the yarding section of it, was linked to the trucks since the horses and tractors hauled the timber to a central road where it was then retransported by truck. In reality there were two methods of doing this. The first, which for analytical purposes will be termed the indirect system, involved hauling all the timber to a central yarding area, or several yarding areas, where it was then stored until it could be retrucked. In this case the researcher was again unable to find any examples of well defined resistance or negative reaction to the trucks and the following quote illustrates why.

> Trucking was no different from what it had alway been. One time (before trucking) we hauled to the river and dumped the load there but after the trucks came we just hauled to the road (gravel road) and dumped the load there. It was only a shorter haul thats all.

In the above case there was a time difference between the two elements of the same phase (hauloff) so that essentially they were removed from each other and the effects of trucking was retained outside the yarding section.

However, in the second case, which will be termed the direct system, there was a direct linkage between the two transporting facilities and the wood being first transported by horse and tractor to the roadside and then loaded directly into trucks and in this case the reaction of the yarding section was somewhat different.

> Every now and then you got stuck or broke a sled or something and had to dump the load and this would hang up the truck cause he was waiting for a load. Sometimes the truckers didn't like the hangups but there was nothing we could do about it. We hauled all the wood we could and when something went wrong it wasn't our fault.

The foregoing quotes indicate that where there was a direct linkage between the new and the old system then the trucks acted as a pacing mechanism and the tractor operators and teamsters had to gear their work to the demands of the trucks and this caused some friction. The friction however, as often as not, resulted in blame being placed on the camp foreman or the second hand for not taking local hauling difficulties into consideration.

> Well we needed a few more horses or another tractor on some of these jobs because we had hard (difficult) ground to haul on. But if we had had another tractor everything would have gone alright.

> No I don't think it was the fault of the truck driver. He had his load to get and that was that. Some of them were hard to get along with and drove us pretty hard like Harry but that didn't do no good because we would just go slower then and he wouldn't get as much as the other fellows.

> Well we really needed another tractor on that job but we just couldn't get one so we had to make do with what we had. Some fellows didn't like the hangups but that's all that could be done about it.

All of these quotes illustrate that where the effects of the trucks were felt back in the yarding system it caused some concern and perhaps some quota setting, particularly where it was felt that the truck driver was not cooperating with the yarding section. However most persons indicated that there was little that they could do about it thereby indicating that it was a management decision. In other

words the trucks were accepted as perhaps necessary but greater managerial care should have been taken in difficult yarding areas in adapting the traditional hauloff to the pacing technique of the trucks. The greatest complaints against the trucks were found in areas where the yarding system was marginal in keeping up with the trucks. In effect the greater the demand placed on the older system to operate at peak efficiency and the more direct the linkage the greater the potential for conflict between the two sections.

These conflicts or frictions when developed did not limit themselves to the work situation but carried over into the camp life itself. It was pointed out that the truckers always sat amongst themselves or with the second hand at meals and seldom if ever with the other workers. In some cases this was interpreted as meaning that the truckers "thought they were better than the rest of us" or "they were always setting with the second hand complaining about something" or "they told the second hand everything that went on and tried to make it pretty hard for us." This however is all interpretation of the truckers and is not factual as the following paragraph indicates.

The researcher did not find any indication of conflict or criticism between the two groups where the indirect system was used. However after finding the cases noted above in the direct system he again questioned some workers involved in the indirect system. However nothing was mentioned of the fact that the truck drivers in all operations sat mostly amongst themselves at meal time and when this was pointed out the following answers were received.

> Well I suppose that's natural. They had more things to talk about among themselves. We sat together too and remember we were in the woods first long before most of them were born.
>
> Sure they had things to talk about. How the trucks worked and how much wood they got and things like that.
>
> Sure they sat by themselves but they had things to talk about same as everyone has. That didn't bother us. They had their job and we had ours.

These quotes illustrate that the same actions received widely different interpretations among the two groups depending on whether conflict arose at the work level or not. If there was no stress at the work level it was considered natural that men doing the same job and therefore with a common experience would want to sit together at meal time to discuss that. In the other camps where there was stress at the work level the same action was interpreted as an attempt to get the men into trouble. It is evident therefore that conflicts when started do not retain themselves at that level but quickly spread into other areas and, no doubt, are increased by misinterpretation of an action that otherwise would go unnoticed.

In this case, mass expansive technology, it is evident that the degree of effect felt backwards in the traditional system was the cause of most friction. Where the two segments were separated in the indirect system there was little stress because the pacing mechanism was localized. However when the direct system was used the effect was not localized and the trucks acted as a pacing mechanism to the rest of the system and this often caused conflict. As a general rule the greater the effect felt backwards in the system the greater the

potential conflict and this was of course greatest when the yarding section was unable to keep the trucks going. It should be noted that most camps operated on the pre-yarding system when the trucks were first introduced and very few operated on the direct system. Those that did were usually the smaller contractors and they soon learned to keep a reserve supply of wood on hand. The trucks however do serve to pinpoint one potential source of worker conflict with the introduction of mass expansive technology and this is where the new technology acts as a pacing mechanism to the pre existing technology. Overall however the stress described here was little more than a ripple and it is correct to say that although mass expansive technology, or this particular item of that type, did create more stress than did substitute technology, nevertheless overall this was minimal and could have been avoided completely by the preyarding or supplementary supply systems.

PART III

PLURALISTIC EXPANSIVE TECHNOLOGY

Pluralistic expansive technology was defined as that type of technological change which forces a reorganization of the production functions and thereby the group performing them and, as well, it forces a change in the linear work group by expanding it. The skidder was classified as an example of this type of technological change. As well the effects noted in the previous chapter were that it forced specialization where none previously existed, it forced cooperation where none, or very little, previously existed, it forced dependence where none previously existed and finally the skidder acted as a pacing mechanism putting pressure on other elements of the linear work group to adapt to its demands regarding the supply of timber.

The effects of pacing as regards mass expansive technology were outlined in the previous section, and except to the degree that it acted as a pacer, comments made there apply equally well to the skidder. However in the previous case the pacing factor could be overcome by modifying the systems approach somewhat but in the case of the skidder this is not possible and the machine always has pacing tendencies. Both the buckers and fellers felt pressure to adapt their work speed to the demands of the skidder and this was the single greatest source of discontent found amongst loggers.

> Well one time a man could take his time and pretty well cut his wood as he wanted to. I could cut three or four cords one day and only one the next if I wanted to. But since we got the tree farmers (skidders) a fellow can't do that cause it has to be kept going all the time, seems like sometimes you don't get a chance to turn around and she's back for another load.

The person quoted above was talking about the work of a feller but since the buckers and fellers rotated, usually on a weekly basis, he was asked whether it made any difference which end of the machine a man was working on.

> I suppose it was hardest on the men inside (fellers) cause it was up to them to keep the machine going. If there was a slowdown it was always blamed on them. The fellows outside had it easier (buckers) anyway thats what I think and I liked to work there because if there was any trouble the second hand couldn't blame me. In the woods though, in bad wood, it was hard going. Another time when it was hard to keep up was when we were cutting close to the road and the skidder operator didn't have a long haul, then it was really hard to keep up. When we got back aways it got easier but I think the fellows on the inside still had to work harder.

This statement, or the gist of it, was almost universal amongst loggers and there was widespread resentment over the pacing mechanism of the skidder. A skidder operator who would modify the pacing mechanism of the machine by varying its speed of operation was almost universally judged to be a good or bad operator on the basis of how well he cooperated with the men by doing this when circumstances demanded.

> Well you take John he didn't work a man too hard. If he found you couldn't keep ahead of him he'd take it easy for a while and give you a chance to keep up. That way the second hand didn't notice it so much as if the skidder had to stop and wait for a load. On the other hand you take Pat he pushed his men hard especially when the skipper was around to see him and the men got a bad name. He didn't get away with it though because as soon as the skipper left they slowed right down so he didn't get any more wood than the other fellows.

> Sometimes it was the other way around and the men inside could cut more than the skidder could haul. We didn't usually do that though unless he was like Pat then we really worked hard so we showed him up when the second hand came around.

Both of the above quotes illustrate that the pacing mechanism of the skidder could be overcome or modified by the skidder operator gearing the pace of his machine to that of the fellers. This closely approximates the setting of group quotas except here the quota was set by the most marginal of the operations involved. If the quota were set as a group item there would likely be a daily rate which was always closely adhered to but since it was set by only part of the unit it could be modified to suit local conditions and could vary as local conditions vary. As noted in the previous chapter production varied greatly between machines and even for each machine on different days and this reflects the adaptability of the modification of the quota setting technique.

The quota setting technique was maintained by a system of rewards and punishments which could be administered by the group to deviants within it. In the case of the skidder operator he was rewarded for cooperation by the fellers not over-producing when terrain and distance dictated that it was the machine which could not keep up the pace. In the case of the buckers they were rewarded by the fact that in the rotation sequence they themselves would eventually be fellers and would be permitted to set the quota themselves at that time. It should also be noted that these are not absolute quotas since production was also affected by the truck driver. As noted

earlier the buckers junked the timber into the required length and then piled it directly onto truck pallets that had been left there for that purpose so that the pallet had to be loaded when the driver returned. In some areas the truck driver cooperated with the skidder unit and if not then the skidder operator often relayed information back to the fellers about when a load started and finished so that they could adjust their pace accordingly.

The pacing mechanism was also noted by the paper companies, or at least its effects were noted, in a time study project of the production system. Following recommendations of that study one company introduced a differential pay scheme for different amounts of wood in an attempt to increase production. However the result of this was most significant, not in any great increase in production, but in the increase in work group solidarity outward directed against the company. The following quote illustrates this point.

> It is also interesting that the loggers, despite their relative success, are dissatisfied with their work. The paper company for which they work had developed an incentive system which pays a fixed sum for an amount of wood cut in one day, but pays three or four times as much if that amount of wood is doubled or tripled. Consequently, the men are always working at maximum output, a condition they describe as slavery and which is particularly hard on the older men.[3]

This quote from Mathews and Iverson of the feelings of one

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[3]Noel Iverson and D. Ralph Matthews, Communities in Decline: An Examination of Household Resettlement in Newfoundland. Newfoundland Social and Economic Studies No. 6. (St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland, 1960) p.50.

particular group of loggers was probably fairly representative of overall statements. However it must be restated that the incentive plan in question was introduced to overcome what studies had shown to be a not particularly efficient use of equipment. The result of the plan was the negative reaction directed towards the company itself, which appears to be a technique utilized to increase work group solidarity against another group or the action of another group. In effect the men were working as hard as they wanted to and the incentive plan, rather than increase production greatly, really created the embryo of a campwide or possibly an industrywide quota system. This mechanism is simply a case of action and reaction.

A contributary factor towards this reaction towards the incentive plan was the fact that on some jobs the contractor was still working on the basis of a projected or budgeted amount of wood and when this was secured the operation was closed. If per-day production increased greatly then the number of days worked decreased accordingly. However logging involved many different types of individuals. For some it was the main source of cash income, for others it was a route to Unemployment Insurance Commission (UIC) benefits and for others it was simply the best alternative open. For those who were interested in UIC benefits a reduction in the number of days worked could leave them without sufficient work time to qualify. Thus increased per-day earnings could lead, in the long run, to decreased yearly income. This was most extreme in the cases of those who simply wanted to use woods work as a route to UIC but it was, no doubt, a factor in the reaction

of all the men since there was limited opportunity for any of them to get sufficient time in on other jobs to qualify under the terms of the UIC plan. Quotes illustrating this point will not be included here but portions dealing with it are included in the following discussion. Here it is sufficient to note how stress at one level, through a series of actions and reactions, can eventually result in an industry wide quota system and as a result instead of a whole series of individual quotas one solid across the board quota system can result.

The second effect of pluralistic expansive technology - specialization - created a dependence of the workers performing one function on those immediately before it in the production sequence and on backwards through the system to the standing tree itself. This point has been touched on in some of the preceding quotes, however, the extreme effect of this can only be outlined in cases where workers depending on each other may have had varying goals. In the preceding paragraph some of the variation in goals were noted. For some workers it was the main source of income, for others a route to UIC benefits. Stress based on the dependence factor varied from a low in groups where all workers had the same goals to extreme in groups where different goals were evident. In the case where all workers within a single linear work unit had essentially the same basic goals, either UIC benefits or a prime source of income, stress within the group was based mostly on individual characteristics of the workers. However when the groups were mixed with, for example, the two buckers, having a primary interest in UIC benefits and the two fellers having a primary

interest in large per day earnings stress became extreme.

> All Al and George were interested in was getting a big cut. They don't care how many men they put out of work or how hard we had to work to keep up as long as they made lots of money.
>
> Sure I wanted my unemployment. A fellow worked hard all the time and he deserved some time off. The way Al and George were going we couldn't get enough stamps[4] and had to try to get some time somewhere else when I finished there.

The two fellers however had different arguments

> Sure we worked hard. Thats what we were there for to make money. Lots of fellows were there just to punch in their time so they could get their unemployment but not me. Its hard to make money though when you get in with a bunch like Mike and Abe. Its not too bad when we were in the woods but when we were on the landing things got slower and there was not much we could do about it.
>
> I liked it better in the old days when we did everything ourselves. Then if a man needed money he could make it without bothering someone else and if a man just wanted to punch in his time it was the same thing. Everybody could do what they liked but its not like that now.

When asked why he did not team up with another group who might also want to make big money the man answered.

> Well that happened sometimes like in Mooseville and we did alright. The other men didn't like it though because it showed up the other crews. They were always saying things about it. Nothing right out, you understand, but I could see they didn't like it. Anyway I think the companies don't like that too much anyway. They want to get more out of everyone and they try to keep things evened up pretty well.

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[4]The term "stamp" refers to certificates received for work indicating the period of time and the earnings. The time worked determined whether a person qualified for unemployment insurance benefits (thirty weeks within a two year period being the minimum time required for loggers at present) and the amount earned determines the size of each payment.

All of these quotes illustrate the attitudes of different men to the dependency factor. Traditionally logging, because it was an individual operation, permitted the co-existance of many different goals and value systems. However with the introduction of the skidder it became a team operation but the men still held varying goals and values. Some of these cannot survive long under the mechanized system. For example using woods work as a route to UIC benefits is not likely to survive much longer both because expensive machinery demands the fullest utilization and also because of the action of the loggers union itself. (This latter point will be discussed in the following chapter). However it is equally unlikely that the really big cutters will win out simply because they form, by definition, a minority group. What is likely to happen is that a universal quota will be set between the two extremes and this will serve as a basis of selection of men before they go into logging.

The final change forced by the skidder was in cooperation between the different members of the same unit. This is not the same as the dependency factor which is seen as linear, i.e. running through the length of the production system, but cooperation is seen as a parallel phenomenon forced between persons doing essentially the same work such as the two fellers or the two buckers. Disagreement between different members of the crew in a parallel direction was again most extreme where there were a high and a low producer working side by side.

> Well I cut a lot of wood in my day but the way it works now its pretty hard to keep it up. Anyway you don't get paid for what you do. You take Peter and me. We worked together last summer and I had

> to work twice as hard as I did before to get the same amount. He didn't want to cut wood he was there to punch in his time. I cut twice as much wood as he did and I got paid the same thing and I don't think that's fair at all.
>
> Well boy I liked the old way best. What they call now the conventional thing. There a man got paid for what he did and not for what someone else did and you could cut as much as you wanted and it didn't make no difference to someone else.

The factor of affecting or being affected by other workers was the most recurrent theme in all discussions. Partly it was caused by measuring the total output of each unit and paying each man within that unit a set amount of the total which meant that where a poor and a good cutter were teamed each was gaining or losing because of the other. However the overall fact is that the skidder produced an entirely different system almost overnight and values held in the old system were no longer possible in the new. To illustrate this the relative prestige of the big cutter in both the old and new systems will suffice. Of course the companies valued a big cutter highly in both systems. However with the workers it was somewhat different. Under the conventional system there was a great deal of pride in being a big cutter and they were well known as was indicated earlier. Except in cases where the big cutter used this to personal economic advantage, as in using it to keep himself in "good wood", he was respected by the other workers and in some cases held a position of leadership amongst them. However under the mechanized system the prestige of the big cutter slipped greatly and the other cutters were often critical of him. If one were on the same skidder with a big cutter there was discontent as was noted earlier. If all big cutters were placed on the

same skidder crew then the rest of the camp sometimes joined forces in trying to get them to adhere to some camp norm of production and the mechanism for this was derision. In extreme cases they were called "company lackeys" and even "scabs" but these were in cases where they were apparently not receptive to other overtures made to them by the rest of the camp crew. One camp foreman perhaps phrased it best.

> You take Gus he was always a good man (big cutter) and in the old days that was alright. The rest of the men looked up to him and things like that. Now they don't like him because they think he is trying to show them up or show off or something.

Part of this no doubt arises from the fact that expensive machinery must be kept operating at peak speed and slower cutters are feeling pressure to keep up with the big cutters which was not a factor under the conventional system. Under the conventional system the phases were separated, a man's production was only measured every third week, and if it were high or low it had no economic bearing on the others. Now, however, production is measured each day and because it gives a running report on the efficiency of each machine the companies are more likely to try to bring each machine up to the level of the top producer while the men act against this by attempting to bring the top producers down to a group or camp level. Just as in the case outlined earlier where the incentive plan eventually reinforced group solidarity we see here the general basis of a camp-wide and possibly industry-wide quota system and while it is still in the embryo stage it is only persons at the extreme ends of the scale such as big cutters who receive pressure to modify their production. However it is possible

that this will eventually produce a rigid quota system which will be enforced across all cutting operations in the province.

Re-examining pluralistic expansive technology it is now evident that the critical variable in determining whether technology will be accepted or rejected is whether it affects the organization of the group existing at the time of introduction and if so the degree to which it affects the organization. In the two previous cases the organization was not affected and there was little or no stress. Here however the organization was affected and the stress and even conflict was greatly increased. Whereas the two previous items were introduced either by the workers or by a group who could be controlled by the workers the amount of stress created by the skidders would not have permitted this. It was only because the companies introduced them themselves that they appeared at all. Part of this was no doubt due to the different values evident in woods workers but it was also a function of the technology type itself which made a demand for workers who held only one value and would not permit the coexistence of the different value systems. This was not a function of the two previous types of technology and became important only when the organization was affected. Therefore technology which affects the organization of the work group is less likely to be accepted by the workers than technology that does not. The degree of stress and conflict involved will be a function of how profoundly the pre-existing organization has been affected.

PART IV

PLURALISTIC CONTRACTIVE TECHNOLOGY

Pluralistic contractive technology is that type which affects the organization of the existing work group at the time of introduction and it also affects its linear size by reducing the number of persons in the linear group. The slasher is an example of this type of technological change but it is important to note that this is a modification of pluralistic expansive technology and most of the data outlined for that type also applies equally well here. However in dealing with this type the researcher was faced by a dilemma. All other types have had effect on what may be termed the traditional work group, that is a group or organization that has existed for many years prior to the introduction of the new technology. In dealing with the slasher, since it replaces the buckers, the only persons still remaining from the conventional group are the fellers. The researcher was faced with the choice of either limiting inquiry to the fellers or expanding it to other groups. The decision was to continue to concentrate on the traditional group but to balance this by including truck drivers as well.

The cutters made two basic complaints about the slasher. The first of these was about the pacing tendencies which still irked some cutters. However the slasher was removed from direct influence on the cutter by both the skidder and the truck but apparently it was still spreading its influence backward into the cutting phase. In addition by replacing the buckers the slasher removed some of the

controlling influence on the skidder operator who was not able to reflect the pacing mechanism backward without having to face criticism from two groups. Thus the fellers lost part of their support in controlling the skidder operators and some of the latter individuals became much less responsive to complaints from the fellers.

However by far the greatest complaint was about the fact that men's jobs were being taken away by machinery. Previous to the introduction of the slasher very few men had actually mentioned this fact. As outlined earlier all the new items of technology, with the possible exception of the truck, actually replaced men at one period or another. However in most cases this was masked because the jobs were not lost in the groups into which the new technology was introduced but it occurred in parallel work groups. As well there was always a time difference between when the technology was introduced and when the men were replaced. However in the case of the slasher the replacement was direct and immediate and the connection was more obvious.

> They (the companies) don't want loggers anymore. They want a few men to run machines and thats all. If they could get rid of us all they would do it.
>
> Well first they tried to work us to death with the skidders and since they couldn't do that they are now trying to put us out of the woods.

These comments came from loggers who were still working in the woods and they tended to see the slashers as part of a company conspiracy designed to force the loggers out. A second group who had dropped out of logging altogether was also interviewed.

> No the companies have no place for men. They want a few big cutters and thats all. They want machines and there is no place for a man. He is just there until they can replace him.
>
> No I don't plan to go into the woods anymore. What would be the use. There are only a few men left and it won't be long before they are gone too. Anyway a man breaks himself up trying to keep those skidders going and what's the sense in that. I quit while I still had my health.
>
> It's okay for the younger men, driving trucks and all. But for us older fellows we can't start over again. The companies only want to use us until they can get some machine to take our place so why do what they want.
>
> Well the trucks were okay but those skidders were hard on the men. It was only the French that brought them here anyway and they just wanted to get our wood. No I'm not going back unless I got to.

This last remark is a reference to the Price group whose entrance into Newfoundland closely paralleled the introduction of the skidder and the two were therefore linked together. When it was pointed out that Bowaters also used the skidder the man answered

> Yes boy I suppose they got to. If one gets it then the other has got to try to keep up and pretty soon they all have them.

The implication of this is that the Price group first brought the skidder into the province which was actually the reverse of what occurred but the man could not be convinced of this.

These quotes illustrate that many loggers, both those still employed and many of those who have dropped out, view the new technology as a conspiracy against the logger. It is interesting that this has only become a common phenomenon since the introduction of the

slasher but is immediately generalized to all company introduced technology even though the loss of jobs has never been considered as an important factor before. The second aspect is that many men are voluntarily withdrawing from logging on their own rather than wait until they are replaced by a machine which they feel is inevitable. Not all of these loggers are marginal. Indeed the researcher was unable to establish a classification for them because included are big cutters and marginal cutters as well as men in between.

The slasher, as already noted, has not yet reached its full potential in the replacement of buckers but from the above it is obvious it has, for the first time, acquainted many loggers with the fact that they may be replaced by a machine. Many are taking cognizance of this and are dropping out voluntarily while others remain but still feel that their period of work will not last long. The point of view just expressed is from that of the traditional work group, or what remains of it, and it is now intended to turn to the newer elements involved in logging to try to obtain a more balanced view of the slasher. To do this the opinions of several truckers who were interviewed are presented below.

Most of the answers received from the truckers appeared to favour, if not the slasher, then certainly the mechanization of woods work.

> Well its got to come sooner or later. There is no place for a man like that (bucker) in the woods today. Everything is done by machines now and if we didn't have them we would only fall behind the others.

> I know lots of fellows don't like them (slashers) but you got to face up to it. We can't go back to what it was years ago. Everything is done by machines today so why not in the woods as well.

Both of these drivers were younger men and exhibited a completely different orientation from the workers in the traditional group. It was noted earlier that the trucks brought a completely different group of men into the woods but the researcher did not realize how different until he asked them what would happen if a machine were introduced that could do away with truck drivers.

> I don't think they could do that. Anyway there is no trouble to get a job as a driver or as a heavy equipment operator. I know lots of fellows who went to Churchill or Wabush and got good jobs down there as drivers or heavy equipment operators so if they did away with drivers here I could always get a job there.

This last statement is rather important and outlines one of the results of specialization. In the previous chapter it was noted that portability was very important for the men who introduced the power saw and the truck into logging. Here it is not the technology but the skill that is portable. The traditional logging group had a kit of generalized skills that were only marketable in logging or in fishing and they tended to oscillate between them carrying their own technology with them. The new loggers have a specialized skill but this specialized skill has a general market and the worker can move from job to job carrying only his skill. Thus the displacement effects of pluralistic contractive technology is not felt by him to the degree that it was felt by the traditional group who had no other alternative. Thus there is a vast difference between the reliance of one or the

other on woods work and it would seem that whereas both groups operate to keep their basic alternatives open mechanization has succeeded in increasing the alternatives for the new logger while eliminating the alternatives for the traditional logger by cutting off one of his traditional avenues to cash income. However both groups appeared to accept that further mechanization was inevitable but for the one with no or few other alternatives there was only resignation and some bitterness while for the other it was considered "just another job" and there were "lots more like it".

Re-examining pluralistic contractive technology from the point of view of a traditional work group it appears evident that the technology will cause stress and possibly be rejected because, in addition to the factors outlined for pluralistic expansive technology it also replaces men by machines directly. Therefore there is greater stress with this type of technology than with any other, except possibly pluralistic expansive when the degree of reorganization is greater than with pluralistic contractive. In either case it appears that the critical variable to consider with technological change is the degree of organization necessary and the less the traditional group needs to be reorganized the less will be the resistance and the stress.

It is also evident from the preceding paragraphs that a series of technological changes can bring in a whole new group of workers into the system who may have a value system which is much more receptive to rapid technological change than the traditional groups.

It is perhaps a misnomer to call this a value system because it appears to rely much more on the fact that this latter group has viable alternatives and that they do not in fact value woods work above the other alternatives. Nevertheless rapid technological change appears to lay the ground work for more rapid technological change by a system of attrition and by creating or demanding a kit of specialized skills generally in demand outside that particular industry.

Conclusions

The original generally stated hypothesis was that resistance to technological change "will be a function of the degree to which the new technology affects the traditional work group existing at the time of introduction. It will be lowest for substitute technology, highest for pluralistic technology with varying degrees between." In the case of non-structured resistance to technological change this was certainly the case.

For substitute technology the researcher was unable to find any case of resistance to it based on a characteristic applicable to the total population. By definition substitute technology does not affect either the organization of the traditional group or its linear size.

Mass expansive technology by definition only affects the size of the work group by expanding it and does not affect its organization. In this case also, at least with the pure type, the researcher was unable to find any degree of resistance to technological change. However some stress between those using the traditional technology and those using the new was found where the new technology made demands on the traditional system which it could not meet. It can be argued that this is not a pure case of mass technology because since the demands were for the traditional group to adapt to the new, the pressure was, in fact, to reorganize the traditional group. However no reorganization did occur so that, although the pressures were generated towards moving trucking from mass to pluralistic technology,

it still remained as an item of mass technology. Except for the stress noted above there was no resistance to the new technology.

Pluralistic technology which affects both the size and the organization of the traditional group created the greatest degree of stress because it forced the most profound reorganization of production functions. Examples of quota setting, conflicts between different elements of the same group, demands for a universal value system, conflict between the workers and the company were noted. Examples of how similar actions receive different interpretations under different conditions were outlined as well and the relative change in the prestige of big cutters. The point of this is that conflict with the introduction of new technology has its roots in the effect on the organization of the work group but does not retain itself long at that level but immediately moves into social areas.

In the second type of pluralistic technology outlined the general lessening of morale of the work groups was noted as well as the voluntary withdrawal of loggers from the production system. However in balancing this it was noted that persons not belonging to the traditional work group i.e. those brought into the woods by new technology, have a completely different orientation towards technological change and this indicates that a series of changes such as occurred in logging can create a favourable atmosphere for new change. This however, since it does not deal with the traditional group, has no effect on the typology except to add a new dimension to it.

On the basis of these four types of technology it can be

stated that for non-structured resistance the general hypothesis holds true. It is also evident that the critical variable in technological change is the effect on organization. The mass appears to be fluid in that it can expand or contract with very little resistance. This statement must be qualified by the fact that there is no example of reorganization technology in logging, that is, a technological type that affects only the organization of the work group, and thus the statement cannot be made in absolute terms. It is clear however that stress only occurred where either the organization was affected or where there was pressure to reorganize.

CHAPTER VII

STRUCTURED RESISTANCE TO TECHNOLOGICAL CHANGE

Structured resistance to technological change has been defined as the type of resistance that is enforced through the medium of a formally organized structure. Since Newfoundland loggers have long been represented by a union it is probable that it would be through this body that the resistive strategies would be enforced. The strategies employed in resisting technological change will be of two types. The first of these are those strategies that are designed to increase the costs of mechanization to the paper companies and will consist of job security clauses in contracts, feather bedding techniques, and a uniform, union enforced, production quota. The second type will probably become more prevelant in stress situations and will consist of work slowdowns, working to rule, and, in extreme situations, strikes to protest the loss of jobs.

In adopting resistive techniques the union executive will probably be reacting to two types of pressures. In the first case pressure will be generated by rank and file members who see themselves threatened by the new technology. It will therefore follow from effects that new technology has at the work group level and will probably first take the form of unstructured resistance techniques as discussed in the previous chapter. An additional factor forcing the union to adopt resistive strategies is that loss of jobs through technological change will be reflected in lower union membership and this will threaten both the physical growth and the financial position of

the union itself. The presence of unstructured resistance to technological change was documented in the previous chapter as was a drop in the total number of loggers. On this basis one would expect that the union would have adopted resistive strategies but this is not the case. The researcher was unable to document any cases of well developed resistive techniques either in the contracts or in general overall union policy. This fact was mentioned to the union executive who agreed that they had not developed any negative policy towards mechanization but, on the contrary, regarded the process as inevitable. The inevitability of technological change has not often produced a *laissez-faire* attitude in other unions and, in fact, it has often been on this basis that they have had job security clauses written into contracts. The absence of structured resistance techniques must therefore be explained by factors other than the unions' perception of technological change. As a first step in this direction it may be fruitful to outline, in skeleton form, the development of unions in the logging industry of Newfoundland.

Unions in Logging

The first attempt to organize the Newfoundland loggers was made in 1936 by the Newfoundland Lumbermen's Association with headquarters at Grand Falls which was successful in signing contracts with the A.N.D. Co. Ltd., of Grand Falls and The International Pulp and Paper Co. Ltd., of Corner Brook. The success of the Lumbermen's Association prompted others to act and within two years three other unions had entered the field. These were, The Newfoundland Labourer's

Union with headquarters at Corner Brook; The Worker's Central Protective Union with headquarters at Deer Lake; and The Fishermen's Protective Union of Port Union. The latter union had been organized as a fishermen's union by Sir William Coaker while the first two grew out of the Newfoundland Lumbermen's Association.

The variety of unions directly involved in logging was a product of the heterogeneity of the loggers themselves. By and large the four unions represented three different interest groups and were further sub-divided on the basis of geography. The Fishermen's Protective Union was involved in logging because a large proportion of its membership went logging in the fall and winter to supplement their primary cash income from fishing. These are the fishermen-loggers (occupational pluralists) discussed in Chapter II. The Labourer's Union represented the interest of other adaptive groups, such as construction workers, who were also occupational pluralists and appeared in logging during slack periods in construction activity. The two other unions, The Newfoundland Lumbermen's Association and The Worker's Central Protective Union, both represented the person who gained most, if not all, of his cash income from logging and were the single status workers also discussed in Chapter II. The last two unions were subdivided on the basis of geography with The Newfoundland Lumbermen's Association, because of its central location at Grand Falls, by and large representing loggers in the east-central portion of the island, while The Workers Central Protective Union drew its main support from loggers in the western section of the island.

Newfoundland had lost Dominion status in 1932 and was now governed by a commission which sought to rationalize the activities of the many unions. The outbreak of the Second World War added impetus to this action and on March 27, 1940 the Woods Labour Board was formed. The Board was made up of representatives of the four unions, the two paper companies and an independent Government appointed chairman. "At the outset it was agreed that the Board would continue for the duration of the war and as long thereafter as all members agreed to continue".[1] In fact the Board survived for eighteen years, until 1958, and in all that time "there was not a strike or a lockout in the industry".[2]

By 1958 Confederation had been an accomplished fact for a number of years and Newfoundland, instead of maintaining its strong ties with Britain, was now becoming an integral part of the North American continent. International unions had already organized most of the loggers in western and eastern Canada and were now interested in extending their organizational activities into Newfoundland. Representatives of the International Woodworkers of America (I.W.A.) and of the International Brotherhood of Carpenters and Joiners of America (I.B.C.J.A.) both appeared at a convention of the Newfoundland Lumbermen's Association in 1956 and both sought support of the membership

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[1]W. W. Hickman, "Labour negotiations in Newfoundland" unpublished paper delivered to the Canadian Institute of Forestry, Annual Meeting at Grand Falls, Newfoundland, November 1969.

[2]Ibid.

for affiliation with their respective unions. A vote on affiliation with the I.W.A. was held but the proposal was rejected. The union then set up offices in Grand Falls and began recruiting members directly and in 1958 received certification from the Labour Relations Board as bargaining agent for the loggers of the A.N.D. Co. Ltd.

At this point in tracing the history of woods unions it is necessary to digress briefly and examine some of the organizational concepts and goals of international unions. There is a considerable literature on large scale international companies which attempt to settle in underdeveloped areas and the difficulties they encounter when the recipient culture does not permit the development of a value system necessary for the efficient operation of these organizations. However international unionism has been a neglected area, possibly because it is tacitly assumed that, since unions represent the workers, there must then be a close relationship between the goals of the workers and the union policy. It is worthwhile to pause and consider that the term international union, in this context, means an American union with branches or locals outside the United States. The union develops in the American context and only after success there does it spread into other countries. The foreign locals make up only a small percentage of the total membership so that policies of the international sector are likely to be determined, at best, by a compromise between the national and international sectors or, more likely, policies developed in the national sector are likely to become international policy as well. The American union experience has been based on an

industrial culture and there are some underlying assumptions which may not hold for non-industrialized societies. Some of these, of interest here, are, that the worker in a factory system has a career; that it is his only, or at least his prime, source of income;[3] and, finally, that the worker is always part of the occupational system represented by the union and that the union's position is that of a buffer. It is a buffer between the worker and management but it is also a buffer between the worker and others outside the occupation seeking entrance. Mechanisms such as the closed shop union are designed to protect the occupation from encroachment by persons from outside the occupational structure. Because it assumes that the worker has a career, that he is always within the occupational structure, that it is his prime source of cash income, it is assuming that the workers have a uniform value system and that they will make essentially the same demands of an employer.[4]

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[3]Hence the term "moonlighter" to describe a person holding more than one job.

[4]The strife between the American Federation of Labor (AFL) and the Committee for Industrial Organization (CIO), when they were seperate competing bodies, indicates that unity of value systems may have been a very recent development in the United States. For a discussion of the differences between the two see Martin Estey, The Unions; Structure, Development and Management. (New York: Harcourt, Brace & World, Inc. 1967).

Few of these assumptions apply to the Newfoundland logger. There has been little evidence of a career. There have been several different value systems and, as well, a union to represent each. In addition it was not the only, or even the prime, source of cash income for at least sixty percent of the men engaged in logging in 1956. All of this has been catalogued in previous chapters. Faced with a situation such as this the union has only one of two options open to it. It can attempt to modify its basic organizational and operational concepts to fit the local situation or it can attempt to modify the worker to fit the basic assumptions. In the case of the I.W.A. the strategy adopted was the last of these two. However it did not have to entirely create the type of worker it was designed to serve. The forty percent who were single status loggers fell at least partly into that category so that the union policy was centered around that group.

One of the earliest statements made by the chief organizer of the I.W.A. was to the effect that it was union policy to create year around work for loggers. By this he meant not the type of work already performed by the single status workers through a variation in situs but year around work in a single situs. While this policy was based on the existing single status worker it would make him the single status single situs worker that the union was familiar with in the American and in the British Columbia contexts. This goal would create an elite core of loggers and would prevent entry of the occupational pluralists into one of their traditional work areas. The two paper companies which still felt themselves dependent on a large

influx of seasonal labour to cut and haul the timber, were unwilling to cut off their traditional supply of peak labour. Strengthening the companies' resolve was the fact that the union had garnered a considerable reputation as a strong bargainer for loggers in dealings with companies in British Columbia.

The Newfoundland Government also opposed the union's aim of creating a small core of elite loggers and when a strike occurred against the A.N.D. Co. Ltd., the Government intervened. The rationale for intervention was violence which broke out on the picket lines between the union members and police but also between union members and occupational pluralists, some of whom were still going into the woods. The I.W.A. was decertified as bargaining agent for the loggers and the Government set about organizing a local replacement for it. On February 20th 1959 Premier Smallwood went to Grand Falls, taking with him C. Max Lane, then Minister of Fisheries, and his personal choice for president of the new union. The organizing slogan became "pick up your axe and follow Max" and the stated goal was to get both the fishermen and the other loggers back into the woods. Because of its close connection with fisheries it was dubbed the 'fish and chips union' but it succeeded in reaching its objective. The I.W.A. folded as an operating force and in the end many of its staunchest supporters began to filter back into the woods.

The new union, The Newfoundland Brotherhood of Woodsworkers, represented loggers until 1962 and signed two contracts with the paper companies, the first in 1959 and the second in 1961, both for two year

periods. Its most lasting contribution was to make membership in one union a condition of work, in the first agreement after thirty days and, in the second agreement, after seven days. A second clause stating that union members were to be given preference in hiring was also inserted but was not strictly enforced. The new union could best be described as a compromise union. It forged a narrow path between the demands of the single status loggers and the occupational pluralists and in fact was the first union in almost twenty years to attempt to represent both groups since the goal of the I.W.A. would eliminate the occupational pluralists from woodswork. It was also a transitional union coming, as it did, shortly after the adoption of the power saw and just before the paper companies began to move into full scale mechanization.

The Modern Era

In outlining the process of mechanization (Chapter V) the year in which each type was introduced was noted. 1962 marked the beginning of the pluralistic types. It was also noted that in the two cases preceding 1959 the companies sought to externalize any diseconomies by either permitting the workers to introduce the new technology or else by encouraging them to do so by means of incentive programs. By 1962 however we have encountered the last two types (pluralistic expansive and pluralistic contractive technologies) and it is at this point that the paper companies begin to introduce the new technologies themselves and on a large scale. Some of the demands of pluralistic technology are that it must, because of the large

capital expenditure required, be utilized all year around and that it required a highly skilled labour force to operate it efficiently. When the I.W.A. had taken action that would have created this skilled labour force the companies had reacted strongly because they had not, as yet, a need for that type of worker. Now, however, the paper companies were in the position of seeking precisely the same goal as had the international union. The earlier objections that the paper companies would be at the mercy of a strong international union were more than overcome by the benefits that would come from a skilled labour force and, since both the paper companies and international unions, now had this one goal in common the next step became obvious. The I.B.C.J.A. had remained in the province after the departure of the I.W.A. and still had a few loggers as members. In 1962 it quietly replaced the Newfoundland Brotherhood of Woodsworkers as bargaining agent for the loggers. Most significantly this was done, not simply by having the Labour Relations Board decertify the local union but by the voluntary recognition, by both paper companies, of the new international union; a status it still enjoys today. The local union folded. Some of its executive members became executive members of the new union while others returned to the jobs they held prior to 1959.

The aims of the new union are much the same as those of the I.W.A. before it although they are not stated in precisely the same language. Thus the goal of a yeararound elite logging force is not expressed as such but became instead the statement - "If we have a choice between ten men earning twenty-five dollars and twenty-five men

earning ten dollars we will take the former."[5] But the route to higher earnings is through higher production. The route to higher production is through greater mechanization. Mechanization reduces the number of jobs and also demands a skilled labour force. Thus the new union seeks the same goals as did the controversial I.W.A. and about all that can be said of the latter union is that it was several years too early and, perhaps, a little too vocal.[6]

The executive of the I.B.C.J.A. is comprised entirely of single status workers who for the duration of their term in office are full-time paid union representatives. The international branch also maintains a full-time representative at the union headquarters at Grand Falls. In recent negotiations the union bargaining team was made up of thirteen persons including "the International representative, their Financial Expert ..... six others (who) were fully paid officers of the union and only five loggers represented the 4,000 men who work in the woods".[7] Local conditions play a minor part in these negotiations

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[5]This point was made by the International representative in answer to a question on policy.

[6]The statement has often been made that if the I.W.A. were to return to Newfoundland it would still have the support of the majority of loggers. While there is evidence to suggest that there is still some support for the I.W.A. it is doubtful whether it would be sufficient for that union to replace the I.B.C.J.A.

[7]Hickman, *op cit.*, p.11.

as the union pushes for an "Ontario" contract and the paper companies base their counter proposals on conditions in "Quebec, New Brunswick and Nova Scotia".[8] The Ontario logging industry is a fully mechanized industry so that if local contracts reflect wage and working conditions in that industry it is likely that local logging will have to be mechanized to the same degree. This is a principle that the union is, apparently, willing to accept and this is the reason why, although the factors that would lead to formal resistance exist, the union has not adopted formal resistive techniques.

In permitting the paper companies a relatively free hand in their drive towards mechanization the union has had to accept the fact that it would lose membership strength. In fact this has happened and the union membership has declined from a peak of 4,949 in March 1963 to 3,054 in December 1969.[9] However, a compensatory factor has been that most of those who remain as loggers are not part-time union members but are full-time year round members and are becoming more akin to the single status single situs worker with each succeeding contract. The second factor involved, that lower membership will also mean a drop in union finances, can be compensated for. Initially this was done by simply raising union membership dues from two to three to five to the present eight dollars per month. There is obviously a limit as to howhigh union dues can go and the union has taken cognizance of this

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[8] Ibid.

[9] Collected from the files of the I.B.C.J.A.

fact by branching out into other areas. In addition to the local loggers it now represents workers at Atlantic Design Homes in Stephenville and is hopeful of organizing the loggers at the Melville project in Labrador. It has also adopted a rather rigid policy towards sawmilling. As noted earlier, most sawmills existing today are the small family type operation with only a few employees. Most of these mills are rather marginal in operation providing only part-time work and, even then, only at very low wages. That they are usually combined with some other occupation is probably the reason that they are viable at all. The union is opposed to these types of operations and has adopted what may be paraphrased as a 'big is good, bigger is better' policy in that they strongly support large scale sawmilling. Large scale operations are much easier to organize and have the membership required to support a strong union with a full-time executive. They are also more capital intensive than the small scale operation and employ less labour for a comparable output. Large scale operations demand the single status single situs worker of the factory system while the small scale operation demands a multiple situs, and possibly a multiple status, worker and the union reaction to small sawmills is probably as much a product of the basic assumptions underlying the type of worker as it is to a desire to extend union membership.

The brunt of mechanization has been borne most heavily by the occupational pluralists. Table 13 presents data on areas where other resources are available to the residents. In all cases there has been a considerable drop in the number of men employed in logging

TABLE 13

AREAS OF OCCUPATIONAL PLURALISM BY NUMBERS OF LOGGERS SUPPLIED

YEAR	1956	1966
Fogo Island	207	< 40*
Twillingate	188	< 40*
Springdale	110	< 40*

* data not recorded for areas supplying less than 40 men.
Source: Price Nfld., Ltd.

TABLE 14

AREAS SUPPLYING SINGLE STATUS WORKERS BY NUMBERS OF LOGGERS SUPPLIED

YEAR	1956	1966
Badger	111	97
Bishops Falls	116	118
Norris Arm	145	158

Source: Price Nfld. Ltd.

between 1956 and 1966. For two of these areas, Fogo Island and Twillingate the other resource is fishing and the figures indicate that the fishermen are no longer going into the lumber woods as they once did. In the case of Springdale, this area has, during the past several years, been the center of mining activity and the figures indicate that men who had previously been loggers no longer are and many have gone into mining instead.

Table 14 presents data for the same period for areas that have no other base resources, other than the forests, available to them and are the areas from where some of the single status workers have traditionally come. In the same ten year period the number of loggers coming from these places has remained almost constant with one settlement recording a drop of about ten percent and the other two showing slight increases.

The two tables indicate that whereas the number of occupational pluralists engaged in logging has fallen off radically the number of single status workers has remained about the same thus bearing out the disproportionate effect that mechanization has had on the two different groups. One could argue that in cases such as Springdale the withdrawal may have been voluntary as a result of the mining development. However this does not question the principle involved, which is, that technological change displaces many workers in either the linear work group or the parallel work groups and, in this case, the displacement has been greatest amongst workers who have other alternatives open to them and thus do not need, or perhaps want, to go into logging as a year around activity.

Union policy has also contributed to the disproportionate effects that mechanization has had. Preference given to union members in hiring has been more rigidly enforced with each successive contract. Union members are carried on the union rosters for a period of six months when not engaged in logging and after that they are dropped from the roles. Membership may be retained by a payment of one dollar per month while not engaged in logging but, since logging is not a planned activity for pluralists but something they do because of poor earnings in other sectors, it is unlikely that many would retain membership by this means. For a pluralist who attempts to return to logging after an absence of a year or so, he finds that jobs go first to union members and, if there are any still available after all union members have been hired, only then to himself. In this way the union hiring clause has, in fact, been working as a job security clause for the single status logger, the logger the union is best equipped to serve, and this probably explains why the union executive has not had greater pressure from this group to adopt resistive strategies.

A new seniority clause written into the last contract is likely to increase this discrepency. Under this clause seniority is computed on the basis of time worked in logging and when jobs become available it is to the worker with the greatest amount of time worked that they will go. A single status logger, since it is his only source of cash income, is likely to have much more time worked in logging than a pluralist who has other options open to him at different seasons. It is likely, if this clause is strictly enforced, that one year hence

there will be no occupational pluralists still active in woodswork.

This last possibility raises the likelihood that the union will have to reverse its stand on mechanization and adopt structured resistance techniques. When the last of the pluralists have been eliminated the union hiring clause and the seniority clause will cease functioning as job security clauses for the single status logger. If mechanization continues past that point it will then be the hard core union supporter who will lose his job through mechanization and who will then begin putting pressure on the union executive to resist mechanization. Since he is, like the union executive, entirely dependent on logging it is probable that he will have greater success in forcing the union to adopt resistive strategies than the pluralists have had.

A second factor that may contribute towards the union having to reverse its stand on mechanization is that with each successive round the replacement of man by machine becomes more direct and obvious. With the first round of technological change, the substitute and mass expansive technologies, the disappearance of a job was not as visible as it might have been. The worker did not receive a layoff slip to be replaced by a machine. Rather he received a layoff slip at the end of the season's work as he always had done but when he attempted to return the following year, or several years later, there was no job available. Thus there was no direct replacement but a gradual change from one year to the next. The effects were often offset by developments in other segments of the economy, particularly since it

was the pluralists who were displaced. The construction industry expanded greatly during the period of maximum technological change in logging and attracted many workers. Developments in the social sphere, particularly the introduction of UIC benefits to fishermen encouraged many fishermen who normally would have gone logging to stay at home and draw these benefits instead. However the replacement is now more direct. Logging has become a yeararound activity and a man is replaced directly by a machine so that there will probably be greater reaction as the relationship becomes more obvious. This coupled with the fact that alternatives to logging cannot be created as cheaply as they once were and the single status single situs worker is more dependent on this one source than the pluralists were indicates that the union will receive greater pressure from union members to adopt structured resistance techniques.

Conclusions

In examining structured resistance to technological change it was found that two of the factors that could have led to the adoption of resistive techniques were present but that no such strategy had been developed by the union. Examination of the history of unions in logging revealed that there had been several unions present up until 1958, each representing different interest groups, but at that time one union had attempted to represent all loggers. It was, however, unable to do this and because of its underlying assumptions as to the nature of a worker it was representing one group of loggers only. Some of its policies, including the union hiring clause and the seniority clause, because

they operated against the pluralists, were operating as job security clauses for those workers that the union was best equipped to represent. It was also found that although the union had lost members because of mechanization, the effects of this had been modified by increasing union dues and by organizing outside the logging industry. However it was predicted that this phase is nearing an end and that the union would probably have to adopt resistive techniques in the future because most of the pluralists had been displaced from logging and it was now the single status single situs worker who would be affected by successive rounds of technological change. In summary, several of the factors that could have led to structured resistance were present but their effects were modified by the presence of a second group of loggers, whom the union was not equipped to represent, who bore the brunt of the costs of mechanization.

CHAPTER VIII

THE MECHANIZED LOGGING SYSTEM

The previous three chapters have traced the technological changes that have occurred in logging during the past twenty years and have outlined both the effect that new technology has had on the traditional work group as well as the resistance it has encountered from that source. However the effects of new technology often go far beyond the actual group that has to utilize it directly and eventually it can spread its effects into all segments of the production system, including both the staff and line functions. This is what has occurred with the introduction of new technology into logging and it is intended in this chapter to trace some of the changes which have occurred either as a direct or indirect consequence of new technology or a combination of several new technologies. Chapter III has outlined the production system using the conventional technology and has focused on the head office, the divisional office and finally, in more detail, on the individual logging camp. It is here intended to follow the same procedure but it is intended to focus more directly on those things which have changed, or are different as a result of the new technology. Further, since the new items of technology have been outlined in considerable detail in the previous chapters, it is not necessary that they should be discussed again here. Rather interest will be focused on changes in the organization and in the logging camp itself.

The Head Office

In discussing the conventional logging system (Chapter III) it was possible to draw a distinction between the functions performed by the head office and those performed by the divisional offices. In the mechanized logging system, because of continuous operation and the improvements in private and public road systems, the head office has entered more directly into the day to day operations that were formally the preserve of the divisional offices. This is modified somewhat by distance factors as those divisions on the periphery of the timber holdings, and thus far from the mill site, still retain greater control of the day to day operations at the camp sites than those divisions that lie closer to the mill site. However even in these cases the head office is more aware of, and involved in, the routine day to day operations than under the conventional system.

The divisional offices close to the mill site have, in some cases, been moved from the settlements giving access to the forest lands to the paper towns, and the staff is now part of the head office staff. The breakdown into divisions, at first caused by geographic factors, now exist for bureaucratic reasons. The managers of the various divisions may reside in the paper towns and control operations in the field from there. Thus the woods manager, the status at the apex of the line production system, is in constant contact with the divisional managers and there is a direct formal line between the two statuses and a personal line between the persons filling them. The routine chores of the divisional offices, including hiring, layoffs and pay,

are performed by headquarters staff and the divisional managers no longer have accountants, clerks, and scalers under their direction as they once did. One of the few exceptions to this is the Bowater's operation at Glenwood where, because of the great distance from the paper mill, the company still maintains a full accounting and scaling staff. With this exception the head office in the mechanization system is synonymous with the divisional office in the conventional system. It performs the functions of centralization of accounting and supply, the direction of daily operations, and houses the operational and planning core of the woods departments.

A second change that has occurred in the organization of the woods departments in the mechanized system is that there is now a greater distinction drawn between staff and line functions.[1] In the conventional system men often moved back and forth between the two, at one time performing line functions and at another performing staff functions. With the expansion into year round activity, and the consequent creation of more year round statuses, this is less prevalent. The exception to this occurs during the spring when, because of poor road conditions, operational activity ceases for up to two months and some persons filling roles at or near the apex of the line unit may still perform some staff functions such as planning for the following years operations or compiling statistical data on the previous years operations. However most persons filling roles in the line unit are specialized in that area. This rationalization, which is both an

[1]For an excellent discussion of the distinction between staff and line see Alvin W. Gouldner, Patterns of Industrial Bureaucracy (New York: The Free Press, 1954).

indication and a product of formal bureaucratization on the industrial model, has allowed greater and greater specialization and this in turn permitted the employment of persons with more highly developed specialized skills rather than the generalized kit of skills demanded by the conventional system. This in turn means that the requirements of a particular position can be more precisely determined and the requisite skill can be more accurately detailed thus permitting the pre-selection of persons who are qualified, at least technically, to fill these roles.

With the extension into year around logging and the increased specialization other distinctive characteristics of the logging industry have almost disappeared. An example of this lies in the distinctive methods used in the conventional system to maintain and to train the technical persons needed. A change in situs was exhibited by almost all persons as the yearly cycle of different phases occurred, and, although it was more dramatic at the camp operational level, it also occurred at the staff line level as in the case of scalers who performed different functions in different phases and between phases. Similarly camp contractors and foremen also appeared in, what in Chapter III, was termed as "make work" projects which would give them greater yearly income and thus prevent them from being drawn away from the paper companies into other segments of the economy. With the extension into year around cutting these distinctive facets have almost disappeared. A scaler, except for a short period in the spring, is always a scaler. A camp contractor or foreman is always a camp contractor or foreman and since he can now work for up to ten months each year in this

position it is unnecessary for him to be placed in "make work" projects. Thus his role has become more specialized and institutionalized and his kit of skills becomes more limited in scope. It is likely, therefore, that the successful foreman or scaler will now be judged more on his performance in this more specialized role rather than on his ability to perform several different types of work and thus his ability to fill several different roles, varying from camp contractor to staff employee to fire warden, and we are likely to see a different type of person filling these positions in the future.

With the disappearance of the large influx of seasonal labour in the fall and winter there has been a large drop in the number of persons who are hired as "assistants" in various capacities. It was noted that in the conventional system this provided training and it was the mechanism whereby aspirants acquired the skills necessary for permanent employment as a scaler, or as an accountant, or as any other status in the woods industry. This is becoming less prevalent as the demands for a more highly specialized skill becomes more predominant and more and more reliance is being placed on employing persons who have the nucleus of this specialized skill, either by graduation from a trade school in the case of a trade, or from a university for those who must fill specialized staff roles. In line with this the paper companies have sometimes encouraged employees to seek higher training by paying them to attend trade schools. Where the schools needed to teach these skills do not exist, the companies either develop them, as in the case of Bowaters who have operated a school for loggers on the

west coast, or send aspirants outside the province to acquire the required specialized training. In line with this last case, Price Nfld., trains forest rangers at the University of New Brunswick rather than have them come up through the ranks. In the management category this indicates a change towards the "know how" rather than the "do how" type of manager. It also indicates that a greater reliance is being placed on formal education amongst aspirants and this will presumably produce the type of manager who can communicate how a task should be done by written or oral communications rather than by demonstrating how it should be done. It is interesting to note that the top level of the present management is made up of persons who have come up through the ranks, while the newer specialists appear in the middle range. At present the desired or preferred manager is a person who combines both the practical experience with the more formalized type of learning.

These four, rationalization, specialization, the formal staff-line structure, and the change in the traditional method of transmitting skills are the most important changes that have occurred in the management level of woods operations. Taken together they indicate a change in the direction and level of skill requirement and more closely approach the tenents of the formal bureaucratic model of the industrialized society. They also indicate the direction that skill requirements may take in the future and that is towards still greater specialization, higher formal education coupled with highly technical training in a carefully delineated skill area. The movement is from generalist towards specialist and it is highly likely that the current group of

top level managers will be the last that will attain these positions solely by virtue of promotion up through the ranks.

The Logging Camp

The individual logging camp which was the center of the line production unit in the conventional logging system has received some competition in the mechanized system. Because of the improvements in woods roads some loggers now live at home and commute to their jobs each day. However the predictions made in the early 1960's that commuting would soon completely replace the logging camp have not materialized and the camp is still an integral part of the operations of both paper companies.[2]

The logging camps that have been constructed in the late 1960's are a far cry from those that existed previously and the greatest reason for this is, again, mechanization. Of course the loggers union has played an important part in this change but it was the greater mobility permitted by the use of trucks, which allowed the construction of units of more permanent design, that accounts for much of the change.

A logging camp today may be constructed for a life span of twenty years or more compared with an average life span of three or four years in the conventional system. It has therefore been possible to incorporate improvements in design and to add water and sewerage

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[2]This prediction was made by, among others, R. D. Peters in "The Social and Economic Effects of the Transition from a System of Woods Camps to a System of Commuting in the Newfoundland Pulpwood Industry", (unpublished Master's Thesis, Memorial University of Newfoundland, 1966).

systems both of which would not have been possible without the longer life span. The camp units are also not limited to the maximum of fifty or sixty men as they once were but some camps are so situated that they are within cutting range of several hundred thousand cords of wood and have a capacity of up to two hundred men.

The camps are open for up to ten months each year and are so constructed so as to give the maximum comfort and room possible under the larger capital budget permitted by longer life. Some of the improvements include heat from oil stoves or furnaces, hot and cold running water and indoor plumbing. Recreation rooms, equipped with television and games, have been designed into the larger units. The standard cook house still exists but is equipped with refrigeration units and is of cafeteria type design. The bunk houses may be of single or double story design and are equipped with two or four man cubicles compared to the open design of the conventional bunk house. Diesel lighting plants are standard at all camps and buildings such as repair shops and garages, reflecting the new emphasis on technology, have been added. Almost all of these changes have occurred since the beginning of the technological changes discussed in this paper and most of them have occurred during the past ten years. Very few of these would be possible without the extension of camp life into a year around activity and the greater life span that mechanization and mobility have permitted.

As well as the changes in the basic design of logging camps the number and variety of statuses in any one camp have greatly increased and they are more permanent statuses reflecting the greater

specialization and permanency of the mechanized system.[3] In any one camp the standard statuses of cook, "cookee", contractor, "second-hand", still exist but the number of these have increased greatly. Some camps operate on a shift system and there are often two or three shifts of cooks and "cookees" attached to any unit. Sometimes one camp will house two contractors and their crews but if not then there are often several "second-hands" in the camp reflecting the familiar pyramid shape of bureaucratic organizational charts. Mechanics, truck drivers, crane operators, heavy equipment operators, and even bus drivers may be attached to any one unit. The conventional system in which about eighty-six percent of the men resident in camp during the cutting phase were actually cutting the timber has been replaced by the mechanized system in which the men who cut the timber are a minority.

The Glenwood operations of the Bowater Company is one of the more highly mechanized operations in the island portion of the province. There a tree may be cut in the morning, hauled to a gravel road by a skidder, loaded onto a truck and transported to the rail terminal, loaded onto a slasher which then junks it into the required length,

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[3]The distinction between a status and the person filling it is important here. Although a status may exist for up to ten months this does not mean that it always need be filled by the same individual. In fact there is some evidence to suggest that the extension into near year around activity has not been paralleled by a movement towards year round work by the cutters to the degree that one might expect. In 1956 workers in the operations of Price Nfld. Ltd. (then A.N.D. Co. Ltd.) recorded an average of 76.8 days worked. In 1968 the average number of days worked had only increased to 99.6 indicating that many workers were perhaps staying at home and drawing unemployment insurance benefits rather than work as long as they might.

and loaded onto the rail cars. It is then shipped to the mill site at Corner Brook where it may be undergoing processing in a matter of hours. The only point at which the tree is touched by hand is in the cutting, which is still done by power saw, and all the other processes have been automated as much as possible.

Under the conventional system the Glenwood division cut approximately 60,000 to 70,000 cords per year. This required from ten to fifteen camps and even then the timber could only be delivered to the mill several months after it had been cut. Under the mechanized system all of these camps have been replaced by a single unit housing approximately 200 men. The total production has increased to approximately 100,000 to 120,000 cords per year. The Bowater Company received criticism from the Royal Commission (1960)[4] which found that the camps operated by that company and/or its contractors were usually of a much lower standard than were the camps of the A.N.D. Co. Ltd. However the Bowaters camps have improved greatly in recent years and the one in the Glenwood area is as modern as any in the province and is, in fact, the camp on which much of the preceding description has been based.

Conclusion

The changes in technology that have taken place in logging during the past twenty, and particularly during the past ten, years have eventually produced changes in almost every facet of the industry.

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[4] Report of the Commission of Enquiry on the Logging Industry, 1960. (St. John's: Queen's Printer, 1960).

The organization that existed in the conventional system has been modified so that the informal structure has been replaced by a more formal one; the generalist, who moved from staff to line functions and then back to staff again, has been replaced by the specialist with a permanent status; and the father to son, or "learn on the job" method of transmitting skills has been replaced by a demand for more formal education leading to specialized training in higher institutions. At the camp level, the greater mobility has resulted in a longer life span and this has resulted in better living conditions ranging from better sleeping accommodations to a more balanced diet. The number and variety of statuses resident in a camp have been increased and an individual may be employed almost all year around in one set status. In all a gradual evolution in technology at the work group level has eventually totalled up to a revolution that has affected every facet of the industry, from the cutting of the tree to its delivery, from the method of organization even to the quality of camp life.

CHAPTER IX

SUMMARY AND CONCLUSIONS

During the past twenty years the Newfoundland logging industry has undergone a technological revolution, as practically every item used in the cutting, hauloff, and drive phases of the conventional logging system has been replaced by a new item, in a series of changes that have eventually produced the mechanized logging system of today. During the same period the number of persons who have gained all or part of their cash income from logging has decreased from a peak of over sixteen thousand in 1956 to approximately five thousand in 1968. These two related facts form the broad dimensions within which this study was carried out.

The paucity of basic research data on the logging industry, combined with the broad scope of the study, made it necessary to modify the usual method of approach to the problem area. Instead of the normal straightforward testing of hypothesis usually found in studies at this level, a two fold approach, involving the separation of research data into two categories, was used throughout.

One aspect of the two fold approach has been to use what has been termed 'the restricted approach' and under this category data relating to localized characteristics of the conventional logging system have been outlined. These include, a description of the nature of logging, an outline of the technology, and an overview of unusual characteristics of the labour force. As well, changes in these

localized characteristics that have come about because of a change in the technology are outlined in the latter chapters which present a comparative overview of the mechanized logging system.

The second related approach, termed 'the non-restricted approach', involved extrapolating from localized data to logical constructs in an attempt to develop principles that may have application outside sectorial or provincial boundaries.

These two basic approaches will be used in presenting the conclusions of this study and the findings are classified under the heading of the relevent approach. It is, however, unnecessary to summarize all findings in this chapter since most have been adequately summarized in the conclusions to each individual chapter. Therefore, some of the more important findings will be presented and, as well, suggestions for further study will be included at the end of the section.

The Restricted Approach

The most important findings of this study in the restricted approach category deal with, the absence of structured resistance to technological change, the differences between company-owned and logger-owned technology, and changes that have occurred in statuses, value systems, and training methods of the individual logger as a result of change in the technology.

In spite of the fact that resistance to technological change was found at the non-structured level, indications of resistance could

not be found at the structured level. The union representing loggers has not developed a negative policy towards new technology and no resistive strategies could be found in contracts or in over all union policy. This apparent anomoly was explained by the fact that the union that has represented loggers since 1962 was equipped to represent only one of several groups of men. A large group of occupational pluralists, who could not be represented adequately by a union that based its organizational structure and operational strategies on the single situs single status worker, were also present in woodswork in the initial periods of technological change. Since the occupational pluralists have borne the brunt of the negative effects of technological change, the workers represented by the union have not been so adversely affected as they might have been and this has influenced the union's expected response to rapid technological change.

In examining specific items of technology it was found that several items had been introduced by the workers and several items had been introduced by the companies. The common characteristic of the worker-owned technology was portability into other segments of the workers own economy. While factors such as low cost and higher potential sectorial earnings may have been a factor in one or two of the items, the portability factor was the only one common to all worker-owned technology and, on this basis, it was the most important characteristic of the technology introduced by the workers.

It was also found that under the conventional logging system work was carried out as an individual activity and this permitted the

coexistence of many different value systems. However the mechanized system, because it is a team activity, places a demand for a single uniform value system that is geared towards maximum output from the production system and is sustained by a series of pacing machanisms enforced by individual items of technology.

Other findings were based on changes that have occurred in the logging industry during, or since, the conversion to the mechanized system. They include, a change in the method of training workers and management personnel from an on-the-job method to a far greater reliance on formal education and an increased demand for specialized skills. The deliniation between line and staff that barely existed under the conventional system has been changed to a much sharper division more commonly found in a factory system. Finally, the rather informal geographically based structure of the conventional system has been replaced by a more formal bureaucratic structure centered around the centralization of accounting, supply, and planning.

These are the most important findings of this study in the area of the restricted approach. They probably provide some justification for separating the data into two categories which is the technique that has permitted the more detailed examination of localized characteristics than would have been possible if local data were used solely to test a series of generalized hypothesis.

The Non-Restricted Approach

The non-restricted approach was based on the assumption that,

in this case, the point of contact with a new item of technology is through the work group and it would therefore appear reasonable to assume that resistance to new technology will first be a product of the effects that the new items have at that level. On this basis a classification of different types of technology was developed and applied to the specific items that have been introduced into logging.

The general hypothesis was - *Resistance to technological change will increase directly with the effect it has on the linear work group at the time of introduction. Resistance will be lowest or non existent in the case of substitute technology and will be highest for pluralistic technology with varying degrees between.* The results of enquiry for non-structured resistance to technological change were:

Substitute technology:	no generalized resistance to its introduction.
Mass technology:	generalized resistance to its introduction only in cases where the new technology had pacing tendencies and the pressure in these cases was to change the conventional system to meet the demands of the new technology.
Pluralistic technology:	in the cases of both pluralistic expansive and pluralistic contractive technologies generalized resistance to the new items of technology or to some of their necessary consequences was found. Resistance usually took the form of stress between different segments of the production

system and included stress based on the dependency factor, stress based on the demand for cooperation, stress based on the demand for a uniform value system.

It was also found that, with the possible exception of substitute technology, there was a causal relationship between each item of technology introduced, as each new item set up internal pressures for other segments of the production system to be modified to meet the demands of the new technology. In this way each new item was a consequence of some other item previously introduced and then, each in turn, became a cause for other new items to follow it.

These four, the testing of the general hypothesis, the absence or near absence of non-structured resistance to substitute and mass technologies, the presence of non-structured resistance to pluralistic technology, and the causal relationship found between each new type are the most important findings in the area of the non-restricted approach to this study.

Suggestions for Further Study

In a wide ranging study involving the combination of several approaches such as has been attempted here, there are many topics that can be selected for further study. Some of these become obvious from a casual reading of the text but others are less obvious and more speculative.

One of the obvious suggestions is based on the fact that

focusing on the work group as the point of contact with new technology has proven fruitful in this case as it may well do in others. The fishing industry, which is also undergoing fairly rapid technological change, may be a possibility for utilizing a similar focus. Some of the technological types and some of the concepts developed in this study will probably have to be modified to fit that industry but this will only be proven by an attempt to fit the types and concepts to changes in that industry.

A second area of sociological research is an examination of the meaning of work in a system undergoing rapid technological change. Some indication of a variation in loggers attitudes towards work are contained within this paper but this is a very broad area and worthy of detailed research in itself.

A third potential area of study is the effect that new technology has had on the social life in the settlements that have been affected by technological change. It has been noted by many observers, and is now part of the conventional wisdom, that the rugged individualism of the Newfoundlander may have mitigated against the development of political structures at the district and settlement levels. While this statement has usually been made on the basis of the inshore fishery, this paper has shown that there was a large degree of individualism in the logging industry as well. With new technology this has changed and there is now a large degree of dependency and cooperation in logging. At the same time there has been a large increase in the number of community and town councils as well as a wide spread movement towards

the formation of area and district committees. Could the new dependency in the woods have carried over to the community level and is this new spirit of cooperation a product of the demands of the new technology in the work group situation? Admittedly this is speculation, but if the conventional wisdom holds that individualism is a product of the work acitivity then it must also hold that a change there, may produce a change in the attitudes towards community living.

These three suggestions range from the most obvious to the most speculative but all of them have some basis in the material presented in this paper. One further suggestion will be offered and this concerns the continued tracing of technological change as it is now occurring in the logging industry. New machinery such as wood processors are being experimentally introduced and it appears possible that the logging industry will undergo a new round of technological change. While it will not be as dramatic as the changes outlined in this paper in terms of the impact on sheer numbers, it does offer the opportunity to further test the constructs developed in this paper.

One further speculative note can be added to the new changes occurring in logging. The changes outlined in this paper had a definite direction. The movement was from the individual logger's possession of a kit of generalized skills with limited demand under the conventional system, to possession of a kit of specialized skills with generalized demand under the mechanized system. But the new change is toward still greater specialization and many of the skills demanded do not have this generalized market, but are in demand only in the logging

industry. The direction of technological change toward a still more minutely specialized area will limit the alternatives open to the new skilled worker and will place demands that they become completely dependent on logging for their livelihood. How will the workers filling the new technological statuses react to this limitation of their potential alternative employment? That they might resist the new technology is a distinct possibility and provides the basis for further research into the logging industry of Newfoundland.

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