


# When did the Industrial Revolution in the Woods Begin and End?

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The background features several sets of concentric circles in a lighter shade of blue, resembling ripples in water, scattered across the bottom half of the slide.

# From Craft Production to Industrial Production

## Craft Production

- Worker control of production process
- Unified division of labour
- Manual tools

## Industrial Production

- Employer control of production process
- Specialized division of labour
- Mechanization

# Industrialization in Eastern Canada

- Origins of the Shortwood Path of Development: the Forwarder
  - ❖ Canadian Pulp and Paper Association established Project 'e' under aegis of its Mechanization Steering Committee in 1950
  - ❖ Produced various iterations of the frame-steered Bonnard Prehailer through the 1950s
  - ❖ Culminated in the commercial manufacture of the first forwarder by Dowty Equipment in 1960

# Stages in the Shortwood Path of Development: Eastern Canada

<b>Developmental Stages</b>	<b>Topography</b>	<b>Division of Labour</b>	<b>Mechanization</b>
Manual	Stump	Unified	Lo
Trailcutter	Stump	Unified	Intermediate
Shortwood Harvester	Stump	Unified	Hi
Double-grip Harvester	Stump	Intermediate	Hi
Single-grip Harvester	Stump	Unified	Hi

# Origins of the Long Wood Path of Development: the Skidder

- Origins of the Long Wood Path of Development (comprised of tree length and full tree sub-paths)
- Skidders:
  - ❖ 1958: Garrett Tree Farmer first frame-steered skidder
  - ❖ 1961: Can Car manufactured Tree Farmer under licence
  - ❖ 1961: Timberjack commenced manufacture of its frame-steered skidder

# Stages in the Tree Length Path of Development: Eastern Canada

<b>Developmental Stages</b>	<b>Topography</b>	<b>Division of Labour</b>	<b>Mechanization</b>
Manual	Stump	Unified	Lo
Skid & Slash	Intermediate	Intermediate	Intermediate
Tree Length Harvesters	Intermediate	Intermediate	Hi

## Stages in the Full Tree Path of Development: Eastern Canada

<b>Developmental Stages</b>	<b>Topography</b>	<b>Division of Labour</b>	<b>Mechanization</b>
Feller-forwarder	Roadside	Intermediate	Hi
Feller-Buncher	Roadside	Specialized	Hi

## Per Centage of Total Volume of Wood Harvested by Type of Tree Harvesting System (Eastern Canada)

<b>Year</b>	<b>Shortwood</b>	<b>Tree Length</b>	<b>Full Tree</b>
1950	95	5	0
1955	90	10	0
1960	80	20	0
1965	45	50	5
1970	30	65	5
1975	20	70	10
1977	14	68	18
1986	12	35	53
1989	6	15	79
1991	15	13	72
1997	25	15	60

# The Industrial Revolution in Eastern Canada

- ❖ Commenced in the 1960s as a variety of developmental stages from the two different developmental paths appeared and disappeared
- ❖ Ends in the 1990s, given that no new stages have appeared
- ❖ The end characterized by the coexistence of two harvesting systems (single-grip and feller-buncher) from two developmental paths

# Industrialization in the American Southeast

The shortwood path:

- ❖ Commenced and ended with the bobtail truck system
- ❖ System was ubiquitous and long lasting
- ❖ Innovations that did occur (e.g. Big Stick Loader) served to preserve, rather than transform, the system

# Stages in the Shortwood Path of Development: American Southeast

<b>Developmental Stages</b>	<b>Topography</b>	<b>Division of Labour</b>	<b>Mechanization</b>
Manual	Stump	Unified	Lo
Bobtail Truck	Stump	Unified	Lo

## The tree length path:

- ❖ Shift in product from shortwood to tree lengths
- ❖ Wide availability of cable skidders
- ❖ Addition of shears to skidders
- ❖ Development of shear for skid-steer machines by HRP that could be used as a feller-buncher

## The full tree path:

- ❖ Drive-to-tree feller-buncher first with shears, later with disc saw heads

# Stages in the Tree Length Path of Development: American Southeast

<b>Developmental Stages</b>	<b>Topography</b>	<b>Division of Labour</b>	<b>Mechanization</b>
Manual	Stump	Unified	Lo
Manual Felling/ Cable Skidder	Intermediate	Intermediate	Intermediate
Mechanized Felling/Cable Skidder	Intermediate	Intermediate	Hi

# Stages in the Full Tree Path of Development: American Southeast

<b>Developmental Stages</b>	<b>Topography</b>	<b>Division of Labour</b>	<b>Mechanization</b>
Feller-Buncher/ Grapple Skidder	Roadside	Specialized	Hi

## Pace of Development: American Southeast

<b>Developmental Stage</b>	<b>% of all Producers (1979)</b>	<b>% of all Producers (1987)</b>	<b>% of all Producers (1997)</b>
Shortwood (Bobtail Truck)	75.5	21.2	0
Tree Length (Cable Skidder)	25.7	37.1	16
Full Tree (Feller-Buncher)	9.1	42.1	86

# Industrial Revolution in the American Southeast

- ❖ Commences only in the late 1970s and early 1980s
- ❖ Ends in the early 1990s, given that no new stages have appeared
- ❖ Characterized by relatively simple developmental sequences
- ❖ Characterized by the dominance of a single system both at the beginning and the end of development

# Developmental Divergences

## Peculiarities of the industrial revolution in the American Southeast:

- ❖ **Late:** bobtail truck predominates into the 1980s
- ❖ **Short:** fundamental change only starts with tree length systems, ends in 15-20 years
- ❖ **Truncated:** only a few systems used, many stages missing
- ❖ **Derivative:** principal machines and work processes pioneered outside

## But please note:

- ❖ **Not** due to superior Canadian engineering expertise (e.g. Busch Combine and Jarck Go Getter)
- ❖ **Not** due to visionary pulp and paper mill owners for all mills viewed harvesting as an activity best avoided if possible

# Accounting for Divergences

Two primary factors:

- ❖ Availability of abundant, cheap labour
- ❖ Nature of the wood supply system



# Labour in Eastern Canada

- ❖ Government organized post war industrial development
- ❖ Subsequent urbanization and modernization of agriculture eroded the rural labour supply
- ❖ Replacement of horses with tractors in agriculture eroded the supply of horses
- ❖ Mechanization necessary to provide more desirable working conditions and to replace the horse

# Wood Supply System in Eastern Canada

- ❖ Forests organized into large tracts of Crown and mill owned land in isolated areas
- ❖ Workers housed in costly remote camps
- ❖ Together these conditions favoured highly mechanized large volume harvesting systems

# Foundation of Industrial Development

Because only mills could meet the high costs of technological innovation, Eastern Canadian mills :

- ❖ Actively sponsored innovation (CPPA & PPRIC; Logging Research Associates)
- ❖ Introduced company-owned mechanized operations
- ❖ Sponsored the development of contractors capable of financing and operating the new, increasingly capital intensive systems of harvesting

# Labour in the American Southeast

- ❖ Minimal post-war rural economic development
- ❖ Abundant supply of cheap Black labour
- ❖ Few alternative business opportunities for contractors

# Wood Supply System in American Southeast

- Wood dealer system articulated the mill with large numbers of small land owners, contractors, and workers
- Wood dealer:
  - ❖ Made contacts with land owners for stumpage
  - ❖ Connected contractors with land to be harvested
  - ❖ Managed poorly capitalized woods producers
  - ❖ Accumulated the dribbles of wood from many contractors into the streams of wood for the mills

# Foundation of Industrial Stagnation

- Southern wood supply system meant:
  - ❖ Low prices to mills
  - ❖ Low incomes to contractors
- Thus little incentive and even fewer resources for innovation
- Bobtail truck harvesting system – cheap and labour intensive – best suited these circumstances

# Industrial Development

- Economic development in 1970s depleted labour supply
- Mills shifted from pulpwood to tree-lengths
- Tree-length systems came to predominate, with the drive-to-tree feller-buncher coming in to its own in the 1980s

# Questions for Further Research

- What was the pattern of system use and development in the Great Lakes region of the US?
- What kind of wood supply system developed there, and why?
- Why did Sweden remain dependent on horses for so long, and then change to mechanized systems so quickly?
- How did they come to innovate so successfully to revive the cut-to-length path of development?