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Logjams in the Soviet Timber Industry

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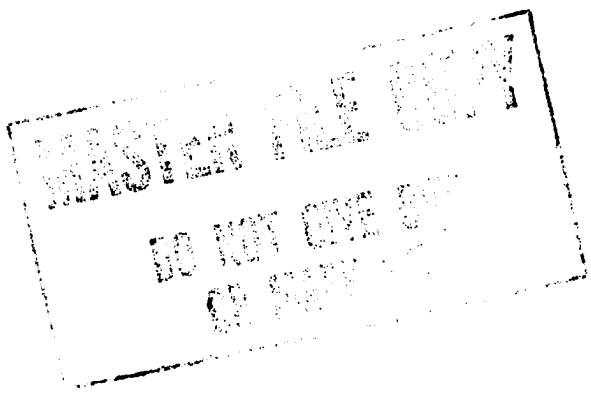
A Research Paper



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SOV 83-10206X
December 1983

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Erratum

Notice to recipients of DDI Research Paper *Logjams in the Soviet Timber Industry*, SOV 83-10206X, December 1983. [redacted] 25X1

Please make the next-to-last sentence in the last paragraph on page 3 read as follows:

In addition, some pulp and paper plants that emit toxic discharges have been accused of destroying trees.

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Logjams in the Soviet Timber Industry

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A Research Paper

This paper was prepared by
of the Office of Soviet Analysis.
Comments and queries are welcome and may be
directed to the Chief, Soviet Economy Division,
SOVA,

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SOV 83-10206X
December 1983

Logjams in the Soviet Timber Industry 25X1

Summary

Information available as of 11 November 1983 was used in this report.

Lagging production of forest products played an important part in the general industrial slowdown in the USSR after 1976. Transportation tie-ups stand out as the critical constraint, but an aging capital stock and low investment, fuel and power shortages, and high labor turnover also dampened performance in the sector. We project a modest recovery by 1985 as rail bottlenecks ease, although the Soviets are unlikely to achieve plan goals. Prospects for production and export earnings should be brighter by the end of the 1980s as world market conditions improve and are likely to be even better by the turn of the century as a result of serious depletion of world forests. 25X1

After rising at an average annual rate of 2.5 to 3 percent in 1961-75, production in the forest products industry actually fell by an average of 0.3 percent a year in 1976-81. Output in the two main sectors—logging and sawmilling and woodworking—declined even faster. Partly as a result of the slide in output, hard currency export earnings from forest products—the USSR's fifth-largest earner—leveled off at $1.0 billion annually in the late 1970s despite the rise in timber prices during most of the period.

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Because of the close integration within the forest products industry, difficulties in logging spread quickly to other sectors after 1976. Rail transport and, in some instances, fuel and power shortages proved to be the most critical constraints as Soviet officials cut back on allocations to the industry, which was given a relatively low priority:

- The volume of timber hauled by rail declined sharply. With rail lines saturated and railcars in short supply, Soviet railroad officials chose to divert rolling stock earmarked for timber shipment to the movement of grain and other critical commodities. Meanwhile, the average length of haul increased as logging operations shifted to remote regions in Siberia, the Urals, and northern parts of the European USSR. The average stayed fairly stable from 1970 to 1977, but it rose sharply in the late 1970s to peak at 1,739 kilometers in 1981—the longest haul for any major commodity in the USSR.

- Transportation bottlenecks had a ripple effect on raw material flows. Sawmilling operated at little more than 80 percent of capacity during the 1976-80 period because of shortages of timber. Pulp and paper inventories fell to 40 percent of the norm, with many factories dependent on day-to-day deliveries. Some plants reportedly shut down production entirely.

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- Fuel shortages hampered logging operations, and electricity brownouts limited production and damaged machinery in the pulp and paper sector.

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The forest products industry was also handicapped by an increasingly obsolete capital stock and shortfalls in carrying out its capital investment program:

- The condition of fixed capital—most of it 35 to 40 years old and at a technological level comparable to that of the United States in the 1930s and 1940s—deteriorated considerably, with more frequent breakdowns. Utilization rates for equipment also fell, as most machinery was involved in production for less than half of the working days in the plan period.

- The falloff in capital investment constrained plant commissionings, particularly in the pulp and paper sector. A traditional and heavily used source of capital replacement—imports—dried up because of scarce hard currency reserves and the general strain in relations after the invasion of Afghanistan.

- The official two-pronged investment strategy—construction of large-scale forest industry complexes in eastern Siberia and renovation of facilities in the northwestern and Ural regions—ran into large cost overruns and delays. Renovation disrupted production, and many projects were abandoned because funds had been used up.

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Manpower shortages—most critical in logging—have persisted because the harsh climate and lack of infrastructure make it difficult to recruit and retain sufficient workers. To supplement the traditional labor force:

- Some 300,000 prisoners, at least 10 percent of the labor force in forest products, have been placed in forced labor at logging camps and sawmills.
- About 30,000 foreign workers are harvesting timber in isolated undeveloped areas. Roughly 7,000 to 10,000 North Koreans have been cutting in the Far East, and 19,000 Bulgarians currently log in Komi ASSR.

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Soviet plans call for the production of forest products to increase by 17 to 19 percent during the 1981-85 period. We do not believe that the Soviets will be able to come close to reaching these goals. Railroad bottlenecks will ease to some degree, but the lack of major capital outlays will leave equipment and machinery in poor shape. The forest products industry will feel the pinch of declining Soviet birth rates, although forced labor will continue to provide a cushion. The expansion of guestworker agreements will be limited because of Soviet xenophobia and domestic labor shortages in the labor-exporting countries.

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We estimate that by 1985, production of commercial timber will stabilize between 279-284 million cubic meters (m^3), while lumber will fluctuate between 96 and 98 million m^3 (versus 275 million m^3 and 96 million m^3 respectively in 1982). Particleboard and fiberboard are likely to be high-growth commodities in forest products because there is ready demand for these cheap substitutes for lumber. Pulp and paper output probably will grow by 1.5 to 2.5 percent a year, with a possible spurt near the end of the plan period because of capacities coming on stream at Ust'-Ilimsk.

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We project hard currency earnings at between $1.1 billion and $1.5 billion (1981 prices) for the rest of the 11th Five-Year Plan period, primarily because of sales of about 14-16 million m^3 of commercial timber and 7 million m^3 of lumber. The Soviets have long-term trade commitments and compensation agreements with Japan that guarantee a large volume of exports and insulate Moscow from wide fluctuations in market prices.

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Export prospects, however, could improve dramatically by the end of the 1980s. In the late 1980s, world prices may rebound signficantly from the nadir in 1982, and Moscow can expect to increase its share of the West European market as a result of overcutting of forests in Sweden and Finland. Increases in exports may also be directed toward China and Japan. Beijing—deficient in timber resources—has concluded agreements with both Soviet and American foresters. Limitations in Soviet ability to harvest and transport timber and rising Chinese import requirements suggest, however, that the Soviet Union will not shut the United States out of the growing China market.

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Prospects for improved earnings with Japan are more tenuous because of the recession and structural changes in Japanese industry. Yet, Tokyo's heavy reliance on trade and large processing capacity leave the door open for future increased trade. Improved trade with Japan will depend on economic terms of trade, political considerations, and Soviet quality standards.

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Longer term trends are likely to make the USSR's prospects even brighter. Experts believe that at the turn of the century tropical forests may be heavily depleted. The USSR's almost unlimited supply of coniferous stock, although not a perfect substitute for tropical reserves, could then capture large new markets. To benefit from this situation, Moscow will need to improve road and rail networks in Siberia and the Far East, as well as the infrastructure in these regions. The Soviets will have to market timber aggressively, step up sorting and grading procedures, and increase the chemical treatment of wood. Under these favorable conditions, hard currency receipts from timber sales could triple or even quadruple.

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Introduction

Logging, sawmilling and woodworking, and paper manufacturing—three of the Soviet Union's oldest industries—have not fared well in recent years. Production has satisfied neither domestic requirements nor its export potential.

Shortfalls in forest products have significantly affected other branches of industry. Although lumber is no longer the main building material, shortages of lumber have held back construction, especially of housing and rural infrastructure.[1]

According to Soviet press accounts, many foods could not be packaged and so did not reach store shelves. The Soviet press also reports that increased production of paper and cardboard for packaging could have reduced waste of the fruit and vegetable harvest by 8 percent. The chemical industry, most notably the mineral fertilizer sector, sustained losses because of insufficient boxes and bags, as did other industries.

Declining production has affected foreign trade as well. A major timber exporter since czarist times, the USSR is less able to satisfy its world timber markets at a time when it badly needs new sources of hard currency earnings.

This report reviews the performance of the forest products industry since 1960, examines the problems that have emerged, and assesses the short- and long-term outlook for production and efficiency

Background

Organization of the Industry

The forest products industry consists of six closely related sectors (see figure 1): logging (22 percent of the industry's gross value of output in 1972), sawmilling and woodworking (39 percent), furniture (17 percent), other woodworking (5 percent), pulp and paper (16 percent), and wood chemicals (1 percent).

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The *logging* sector supplies timber to the other sectors. Activities include cutting and hauling timber, extracting natural resins and tars, producing firewood, and making railroad ties.

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The *sawmilling and woodworking* sector processes the timber, turning it into lumber, plywood, particleboard, fiberboard, prefabricated construction components, wood chips, and other large wooden items.

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The *furniture* sector depends primarily on lumber from the sawmilling and woodworking sector, although it receives some wood directly from the logging sector.

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The *other woodworking* sector acquires much of its wood from the sawmilling and woodworking sector, although the logging sector contributes about one-fifth of its requirements for raw materials. The sector manufactures consumer items—such as wooden dishes, household utensils, sporting goods, and matches.

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The *pulp and paper* sector manufactures wood pulp (or cellulose), paper, and cardboard. It relies on the logging and wood chemicals sectors, and on electric power for inputs.

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The *wood chemicals* sector turns out dry-distilled chemicals, resins, turpentine, and wood chemistry byproducts and depends heavily on the logging sector for its inputs.

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[1] Construction industries in the West have also shifted away from lumber as the primary building material. The emergence of composite materials such as particleboard and fiberboard, portends a slow natural decline in worldwide lumber demand.

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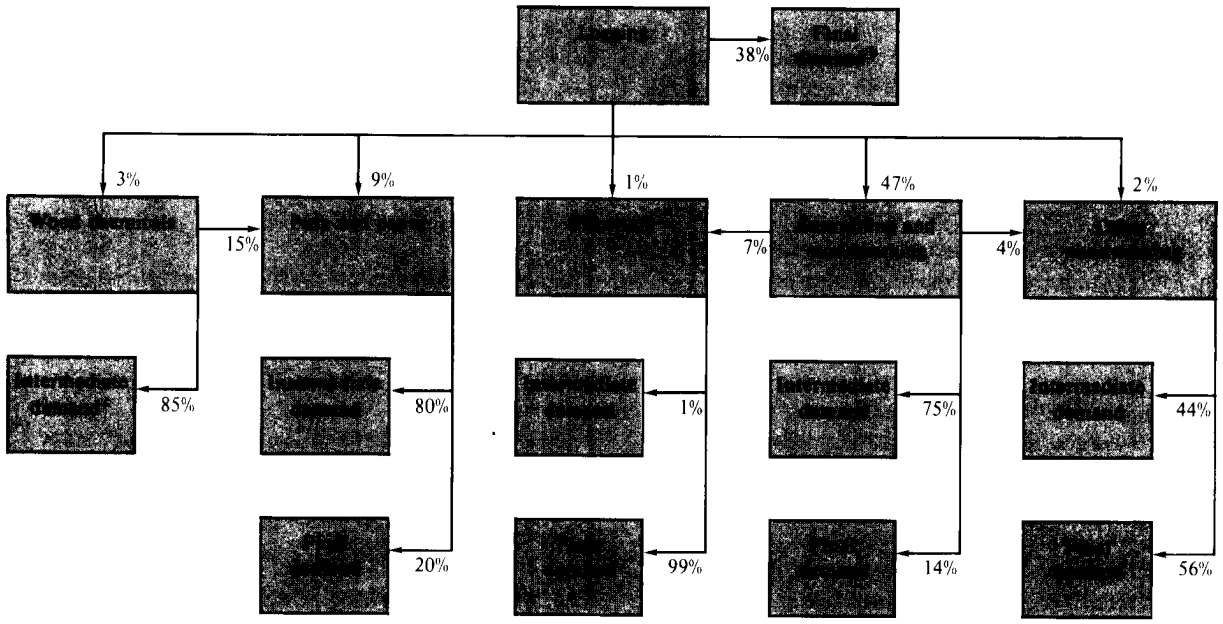
Figure 1
USSR: Organization and Input-Output Flows of the Forest Products Industry[a]



[a] Source: *Narodnoye Khozyaistva 1974*, (identified as *Narkhoz* in the following figures and tables) and *Input-Output Structure of the Soviet Economy 1972*, Foreign Economic Report No. 10, US Department of Commerce: Bureau of the Census, April 1983. This figure illustrates the input-output relationships between sectors in the forest products industry.

[b] Final demand is private or public consumption, investment, or export.

[c] Intermediate demand refers to output that will undergo further processing by other industries.

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Resource Base

The Soviet Union has the largest forest cover in the world—roughly one-fifth of the world's productive timberland (see table 1 and appendix A). Brazil, Canada, and the United States follow in terms of total timber resources. The USSR also leads the world in volume of coniferous reserves. The other conifer-rich countries are Canada and the United States. Even allowing for some exaggeration in the potential that the USSR claims, Moscow could almost double production with its vast untouched reserves; the actual cut is only 56 percent of the allowable [2] cut.

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[2] The allowable cut is the volume of wood that loggers can harvest every year without damaging a healthy, balanced forest. Theoretically, a forest should be managed on a 100- to 150-year cycle, with equal shares harvested and regenerated each year

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Table 1
USSR: Forest Resources, 1982

Forest land [a] (*million hectares*)	1,275
Forested land (*million hectares*)	792
Total growing stock (*million cubic meters*)	84,150
Total mean annual increment [b] (*million m³*)	881
Allowable cut [c] (*million m³*)	640
Actual cut (*million m³*)	357

[a] Forest lands refer to areas that can support the growth of trees, while forested lands are defined as areas that are covered by timber.
[b] The term "mean annual increment" (MAI) refers to the volume of wood added yearly to the growing stock.
[c] The allowable cut is the volume of wood that loggers can harvest every year without damaging a forest. Theoretically, a forest should be managed on a cycle of 100 to 150 years with equal shares being harvested and regenerated each year. Soviet forests do not fit this profile; they are heavily weighted with overmature stands. This imbalance is reflected in the difference between the MAI and the allowable cut. The Soviets in recent years have tried to eliminate this discrepancy by better forest management. If they are successful, the allowable cut could reach the level of the MAI by the end of the century.

In exploiting its resource base, however, the USSR has had to deal with several factors:

- *Accessibility:* Nearly 75 percent of Soviet forests lie in the remote territories of Siberia and the Far East where mountains, bogs, and permafrost impede development. Only half of this area is accessible to commercial cutting because of a lack of roads.

- *Age:* About 70 percent of all stands in the Soviet resource base are overmature. Probably for this reason, half again as many trees die each year as are cut. These overmature stands frequently contain defects such as knots and crooks that lower the quality of the products made from them.

- *Species:* The species mix is mainly coniferous, and larch dominates. Larch is difficult to process because of its high resin content. The sap penetrates the machinery, a characteristic that limits use of this species for domestic consumption or for export. Because of its high density and consequent tendency to sink in water, larch is best transported by rail.

- *Reforestation:* Timberlands commonly are not replanted after clearcutting,[3] and many young trees are destroyed during logging and the construction of factories and roads. Although the lack of reforestation is not an immediate problem, it will force the USSR to draw on more remote areas for wood and to incur greater costs in the coming decade.

- *Overcutting:* Because extraction costs are so much higher in the Siberian regions (see appendix A, Table A-1 for a comparison of costs over time), Moscow has concentrated cutting in the northwestern RSFSR, the forest region exploited by the czars. Timber reserves in this zone have accounted for only 20 percent of the country's total resources but have contributed nearly 70 percent to the annual cut. Many coniferous tracts already have been overcut.

- *Fires:* Forest fires have destroyed vast timberlands in the Transbaikal, Siberia, Karelia, and the Urals. these fires were numerous and their size particularly severe in 1979, 1981, and 1982. Especially noteworthy was the damage in 1982 to timber reserves in Khabarovsk Kray, where approximately 100 million cubic meters (m^3) of timber burned. This represents about 1 percent of the region's growing stock and roughly seven times the yearly export of logs. Khaborovsk Kray is an area whose production is targeted primarily for export. 25X1 25X1

- *Pollution:* 25X1
a pulp complex at Bratsk, one of the main processing centers, has cut its operations by half because of pollution it caused in Lake Baikal. In addition, some pulp and paper plants have been accused of destroying trees that have toxic discharges. While this pollution has not had a major effect on the natural resource base, the Soviets are discussing cleanup programs for the next decade. 25X1 25X1 25X1

[3] In contrast to Western methods, the Soviets rely heavily on clearcutting (felling all the trees in a timber tract) 25X1

Management and Labor Force

About 100 separate organizations manufacture forest products. The Ministry of Timber, Pulp, Paper, and Woodworking (Minlesbumprom), although it is the main administrative body, handles only a little over one-half of the logging and approximately two-fifths of lumber production. It accounts, however, for all pulp and paper processing. The State Committee of Forestry harvests about 18 percent of the annual timber cut and independent loggers and sawmillers—who are loosely associated with different ministries, collective farms, construction units, and factories—account for most of the remainder (25 percent of logging and three-fifths of sawmilling). In terms of employment, the Ministry oversees 60 percent of the full-time workers in the logging, sawmilling, and pulp and paper sectors (see table 2). The State Committee of Forests employs roughly 15 percent of the forest products work force, almost exclusively in logging, and the independents make up the remainder of the labor contingent.

Table 2
USSR: Workers in the Forest Products Industry

Thousand persons

	1975	1980
Total	**4,059**	**4,086**
Logging	1,178	1,045
Sawmilling and woodworking	1,348	1,357
Pulp and paper	269	290
Wood chemicals	14 [a]	16 [a]
Furniture	500 [a]	628 [a]
Other woodworking	NA	NA
Other [b]	750 [b]	750 [b]

[a] Estimated.
[b] This category counts independent workers employed by other ministries, university students, Komsomol members, criminals, and seasonal laborers, who are not included in the official forest products industry labor statistics.

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Timber quotas for the independent loggers' output are included in the plans of the sponsoring associations and are directed by the State Planning Committee (Gosplan). Loggers and sawmillers must provide the wood to the overseeing organization. There is much duplication. loggers and sawmillers from different associations operate similar processing facilities in parallel, "separated by a deaf bureaucratic fence," that prevent economies of scale.

These independent units operate at a high average cost with loggers earning twice the average wage paid by the Ministry. Despite the incentive of high wages, productivity is low. According to one Soviet scholar, labor productivity in these units is between one-half and one-third and sometimes as low as one-fifth that of loggers in Minlesbumprom. In addition, in contrast to Minlesbumprom, independent loggers reforest only a small part of the area they log and generally fail to improve the infrastructure of the region.

In the competition for timber, the concessionaires often harvest only the best timber and ignore less valuable wood, thereby reducing the utility of the area for exploitation. In some areas, specifically near Bratsk and parts of the Baikal-Amur Mainline Railroad (BAM), the independents commandeered major sections of the timber tracts that were set aside for use by the Ministry. They are able to circumvent the established plans easily because these workers log in remote areas beyond administrative control.

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The labor force in the Soviet forest products industry has some special characteristics that bear on its performance.

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in the USSR some 300,000 prisoners, at least 10 percent of the forest product labor contingent, are in forced labor at roughly 350 logging camps and sawmills.[4]

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The strenuous labor and location of the work involved in logging are characteristics well suited to the Soviet penal system—a system that stresses rehabilitation through labor and seeks to isolate impure segments of society. The use of convict labor is not new to the forest products industry. The czars, too, sentenced criminals and political prisoners to remote timber settlements. Current operations are concentrated in

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Table 3
USSR: Average Annual Growth of Forest Products Output [a]

Percent

	1961-65	1966-70	1971-75	1976-80	1981	1982
Forest products industry	2.6	2.9	2.6	−0.3	2.3	0
Logging	0.8	1.2	0.8	−2.2	0.1	−1.3
Sawmilling and woodworking	1.4	1.2	0.1	−3.1	0	−0.7
Furniture	10.4	9.1	8.8	5.4	6.8	4.9
Pulp and paper	7.7	7.2	5.0	0.5	2.6	0.1
Wood chemicals	4.4	−4.4	3.5	0.9	0	0

[a] CIA's index of Soviet industrial production. These indexes are calculated to account for the distortions in Soviet data that result from changes in double-counting and disguised inflation.

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the Urals, the Northwest, the Volga-Vyatka, and the Siberian economic regions. Because of problems with motivation, equipment, and living conditions, convict labor has generally lower productivity and workmanship than other forest products workers.

In addition, about 30,000 foreign workers, or roughly 1 percent of domestic logging and sawmilling workers, are allowed to harvest wood in isolated undeveloped areas. Since 1967 some 7,000 to 10,000 North Koreans have been cutting timber in the Far East, and 19,000 Bulgarians currently log in Komi ASSR. Finnish workers make up the remainder and are located in the Kola Peninsula.[5]

In these guestworker arrangements, the labor exporting countries give 50 to 60 percent of the wood they cut to the USSR and either retain the remainder for domestic use or apply it to external financial accounts. Foreign labor services have been used to pay for current Soviet export of goods and services, for future deliveries, or to repay debt. Guestworkers are offered substantial material and financial benefits—food is cheap, medical care is free, and lodging is either free or inexpensive. Wages are higher than in their native countries and often higher than Soviet pay rates.

Finally, women represent roughly 50 percent of all workers in the forest products industry. They take on some of the most physically demanding jobs, particularly at delimbing sites, where they manually remove branches and sort logs.

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In productivity, workers in the Soviet forest products industry lag far behind their counterparts in the West. The labor force is widely dispersed throughout southern Siberia, the northwestern European RSFSR, and along the Pacific coast—regions similar to Canada in terrain and climate. Nonetheless, for the reasons discussed in the following section, output per Soviet lumberjack is about one-fifth that of a Canadian woodsman.

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Industry Performance, 1961-82

Output

Although the USSR remains the world's largest producer of lumber and the second-largest harvester of logs (the United States is first), the forest products industry slowed Soviet industrial growth during the 1976-80 Five-Year Plan. (See table 3 for industry growth rates and table 4 for absolute levels of production).

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Table 4
USSR: Production of Principal Forest Products

Product	1960	1970	1975	1976	1977	1978	1979	1980	1981	1982
Timber, commercial and fuelwood (*thousand m³*)	369,550	385,019	395,054	384,531	376,660	361,420	353,965	356,637	358,224	355,917
Commercial timber (*thousand m³*)	261,513	298,548	312,902	302,929	296,938	283,555	273,036	277,667	277,340	272,584
Lumber (*thousand m³*)	105,556	116,391	116,159	112,580	109,459	106,275	99,580	98,165	98,108	97,510
Plywood (*thousand m³*)	1,354	2,045	2,196	2,174	2,178	2,122	1,988	2,022	2,035	2,015
Particle board (*thousand m³*)	161	1,995	3,994	4,222	4,590	4,777	4,695	5,118	5,390	5,583
Fiberboard (*million m²*)	67.6	208	409	434	459	452	470	469	482	469
Paper (*thousand tons*)	2,334	4,185	5,215	5,389	5,459	5,548	5,249	5,288	5,399	5,439
Newsprint (*thousand tons*)	434	1,101	1,361	1,390	1,388	1,432	1,420	1,535	1,532	1,580
Cardboard (*thousand tons*)	893	3,516	3,368	3,527	3,605	3,688	3,480	3,445	3,555	3,539
Pulp (*thousand tons*)	2,282	5,110	6,815	7,204	7,448	7,581	7,047	7,123	7,319	7,444
Furniture (*million rubles*)	1,101	2,790	4,256	4,501	4,794	5,087	5,242	5,530	5,907	5,995
Oleoresin and rosin (*thousand tons*)	283	280	332	328	339	340	342	343	343	343 [a]

[a] Estimated.
Source: *Narkhoz* for appropriate years.

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From 1961 to 1975, output in the forest products industry grew by an average of 2.5 to 3 percent per year. Between 1975 and 1980, performance deteriorated abruptly as output on average fell by 0.3 percent per annum. Production in the two main sectors, logging and sawmilling and woodworking, declined substantially.

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The phasing of the decline—the logging sector was hurt before others—suggests that the effects trickled down the line. (See appendix A, table A-3 for annual percentage changes in production for individual sectors of the forest products industry and figure A-1 for a graph of three-year moving average growth rates).[6] Although the logging sector has rarely exhibited annual growth over 4 percent, a marked slowdown began around 1971. One year later the slowdown spread to the sawmilling and woodworking sector, with the annual rate of decline in production accelerating so much that in 1979 output dropped by 6 percent. Pulp and paper did not feel the pinch until 1977. During the first part of the seventies, pulp and paper grew by 4 to 6 percent per annum, but the rate dropped in 1977 to less than 2 percent and in 1979 output declined by 6 percent. Furniture production grew by 8 to 9 percent per year in the early 1970s and by nearly 6 percent per year during 1976-80. Such a high growth rate in the face of an industrywide slowdown suggests that the sector was given priority as a gesture to increase consumer welfare.

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More recently, performance in the forest products industry has been mixed. In 1981 and 1982, production of commercial timber continued to decline. Output of lumber stagnated in 1981 and fell slightly in 1982, while the pulp and paper and furniture sectors

[6] Three-year moving average growth rates are used to smooth out yearly fluctuations and rebounds in growth.

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Table 5
USSR: Index of Forest Products Production

Percent

	Weight in Total Index	
	1970	1980
Logging sector	36.8	30.5
Fuelwood	7.9	7.8
Industrial logs	92.0	92.1
Sawmilling and woodworking	33.9	26.0
Plywood	11.2	12.8
Lumber	88.8	87.2
Furniture	15.5	27.4
Pulp and paper	13.1	15.2
Newsprint	9.2	9.2
Wrapping and packing	8.7	7.4
Printing	3.9	4.0
Writing paper	7.9	6.7
Sacking	5.9	5.9
Offset printing	2.0	2.1
Cover paper	0.8	0.7
Winding	0.4	0.2
Deep printing	1.3	1.2
Lithographic	0.3	0.2
Cartographic	0.5	0.4
Cable insulation	2.5	3.1
Capacitor paper	0.7	0.7
Waxing paper	0.4	0.4
Other paper	12.9	13.5
Paperboard	42.3	44.3
Wood chemicals	0.8	0.8

Note: The CIA index of output in forest products is based on 22 production series reported by the Soviet Central Statistical Administration. Most data for paper commodities were dropped in the early seventies, however, so these are estimated from total paper output reported in the *Narkhoz*.

enjoyed spurts of growth. Preliminary data for 1983 indicate that there will be modest improvement this year. Most important, the output of commercial timber has stopped its decline and exhibited some growth, while the production of paper continues to rebound.

As the volume of production fell in the late 1970s, the quality of output also continued to be a problem. Government grading of forestbased products was uniformly low, especially for the highly processed commodities, and the product mix did not conform to the specifications of either industrial or household consumers. One Soviet survey found that the products of 34 separate enterprises did not meet state standards. a primary reason for the low-average quality is the absence of the measuring and quality control equipment used in most US plants. 25X1 25X1

Some common complaints relating to quality are:

- Lumber is often excessively moist, leading to speedier decay, warpage, and difficulty in handling. Only 14 percent of lumber in the forest products industry is kiln dried, while in the United States and Canada almost all lumber is processed in this way.[7] 25X1
- Poor finishing and trimming of lumber is commonplace. Only 60 percent of lumber produced is edged (the ends of planks are cut evenly). 25X1
- Only two-thirds of wooden railroad ties are chemically treated for resistance to the weather. Other types of products used outdoors are not treated at all. 25X1
- The lack of standardization of products limits economies of scale and requires greater quantities of storage space. Some railroad rolling stock often serves as temporary or permanent warehouses. 25X1

Underlying these complaints about poor workmanship and lack of final-stage processing is a pricing system that encourages poor product quality in two ways. Enterprises are required to manufacture certain items and to sell them at a low price. Squeezed between rising costs and state-set prices, factories forgo costly 25X1

[7] The percentage of kiln-dried lumber is slightly higher, about 35 percent, in Ministry enterprises. Independent loggers rarely have access to such equipment and therefore the share is much smaller. 25X1

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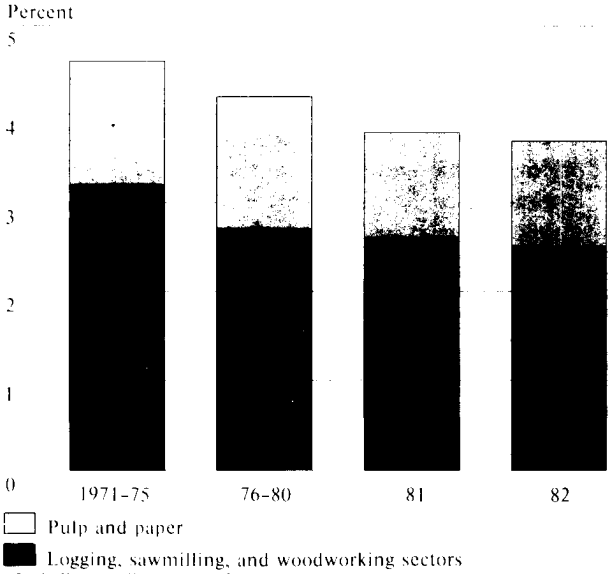
Table 6 *Percent*
USSR: Average Annual Growth of Outputs, Inputs, and Productivity in the Forest Products Industry [a]

	1961-65	1966-70	1971-75	1976-80	1981	1982
Output	2.6	2.9	2.6	−0.3	2.3	0
Input	2.8	2.3	2.1	1.7	2.7	1.2
Capital	11.1	6.9	8.3	6.5	7.2	5.5
Labor	−0.7	0.3	−0.6	−0.4	0.8	−0.6
Factor Productivity [a]	−0.2	0.6	0.5	−2.0	−0.4	−1.2
Capital	−7.7	−3.8	−5.3	−6.4	−4.5	−5.2
Labor	3.3	2.5	3.1	0.1	1.5	0.6

[a] Combined factor productivity is calculated using a Cobb-Douglas (linear homogeneous) production function. Inputs of labor and capital are weighted with their respective income shares in 1970, estimated in the derivation of GNP at factor cost in that year. Labor is assigned 69.5 percent and capital 30.5 percent.
Source: CIA's index of Soviet industrial production.

Figure 2
USSR: Share of Capital Investment Allocated to the Forest Products Industry [a]



[a] Including small amounts of investments made by collective farms; data for other years exclude such investments. In value terms, capital investment for the logging, sawmilling, and woodworking sectors amounted to 5.4 million rubles (comparable prices) in 1971-75, 5.9 million in 1976-80, and 1.3 million in 1981 and in 1982. The pulp and paper sector's share of investment totaled 2.4 million in 1971-75, 3.2 million in 1976-80, and 0.6 million in 1981 and in 1982. The total ruble amounts for capital investment in the timber branch were 7.8 million rubles in 1971-75, 9.1 million in 1976-80, and 1.9 million in 1981 and in 1982.

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Table 7 *Percent*
USSR: Average Annual Growth of Fixed Capital in the Forest Products Industry [a]

	1961-65	1966-70	1971-75	1976-80	1981	1982
Capital stock	9.3	7.4	7.7	6.6	5.5	6.2
Capital investments	6.0	2.9	5.6	0.2	5.6	0

[a] Sources: These figures are derived from yearend data.

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quality-control checks. Some plants cannot pare costs to these levels and manufacture a number of forest products at a loss. In addition, wood products have been in such short supply at these low prices that consumers have bought up existing inventories, removing the incentive that oversupply might have been to improve quality. This may change, however, because wholesale prices for products have been raised recently. The US Embassy reports increases of roughly 30 percent, while reporting from the Soviet underground press places the price hikes at 40 percent.

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Supplies of Capital and Labor

Some of the slump in output during the 1976-80 period can be traced to a slight fall in the growth rate of inputs of capital and labor into the industry. Compared with the 1971-75 period, the average annual growth rate of fixed capital declined by almost 2 percentage points; the ongoing decline in the labor force was arrested somewhat (see table 6). As a result total inputs increased by an estimated 1.8 percent a year during 1976-80, compared with 2.1 percent a year during 1971-75.

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Fixed Capital. After a steady increase in the 1960s and early 1970s, the growth rate in capital stock declined in the 1976-80 period (see table 7). The flow of capital investment became a trickle in the 10th Five-Year Plan, as Moscow shifted more funds to

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Table 8
USSR: Commissioning of New Capacities in the Forest Products Industry [a]

	1966-70		1971-75		1976-80		1981-1982	
	Total	Annual Average	Total	Annual Average	Total	Annual Average	Total	Total
Lumber (*million m* ^{3})	4.6	0.9	5.3	1.1	4.5	0.9	0.7	0.7
Cellulose (*million metric tons*)	2.2	0.4	2.1	0.4	0.9	0.2	0.3	0.1
Paper (*thousand metric tons*)	502	100	509	102	271	54	255	115
Cardboard (*thousand metric tons*)	1,359	272	803	161	350	70	NA	461

[a] Including capacity originating in new construction and in expansion and construction of existing plants. Source: *Narkhoz* 1980.

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energy and agriculture and substantially cut back the increases in total investment and the share allocated to the forest products industry. During 1971-75, the industry's share of total capital investment was 4.6 percent. By 1982 the branch's share had declined to 3.7 percent (see figure 2).[8]

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The downturn in investment primarily affected the commissionings of new plants and the expansion of older plants (see table 8). In the pulp and paper sector, new capacities added in the 1976-80 period were less than half those added in the previous five years. The pulp and paper plants that did come on stream produced primarily newsprint. The situation improved in 1981, when capacities of 255,000 tons for paper production were added, nearly as much as in all of 1976-80. Several long overdue projects were finally completed, primarily the complex at Ust'-Ilimsk. The volume of unfinished construction for the industry, however, was still high—over 70 percent throughout 1976-81. Only about 20 percent of the new investment was allocated to new construction (see appendix A).

Labor. Except for the pulp and paper sector, employment in the forest products industry has been stable or in decline since 1965 (see table 9). The number of lumberjacks, in particular, has been shrinking steadily since the mid-1960s, although technological advances, especially improvements in automation have compensated somewhat.

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Manpower shortages in logging—most critical because of the resulting slowdown in the raw material flow—have persisted for two reasons. The harsh climate and lack of infrastructure make it difficult to recruit and retain sufficient workers. In addition, fertility rates among Russians, who traditionally work

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[8] The 1981 investment figure includes small amounts of investment made by collective farms: data for other years exclude such investments.

Table 9
USSR: Average Annual Growth of Employment in the Forest Products Industry [a]

Percent

	1966-70	1971-75	1976-80	1981	1982
Forest products industry	0.3	−0.6	−0.4	0.8	−0.6
Logging	−0.8	−1.2	−0.9	0.1	−4.8
Sawmilling and woodworking	0.8	0.4	0.2	−0.8	0.6
Pulp and paper	1.7	0.9	1.3	0	−0.1

[a] Data are derived from *Narkhoz* for appropriate years.

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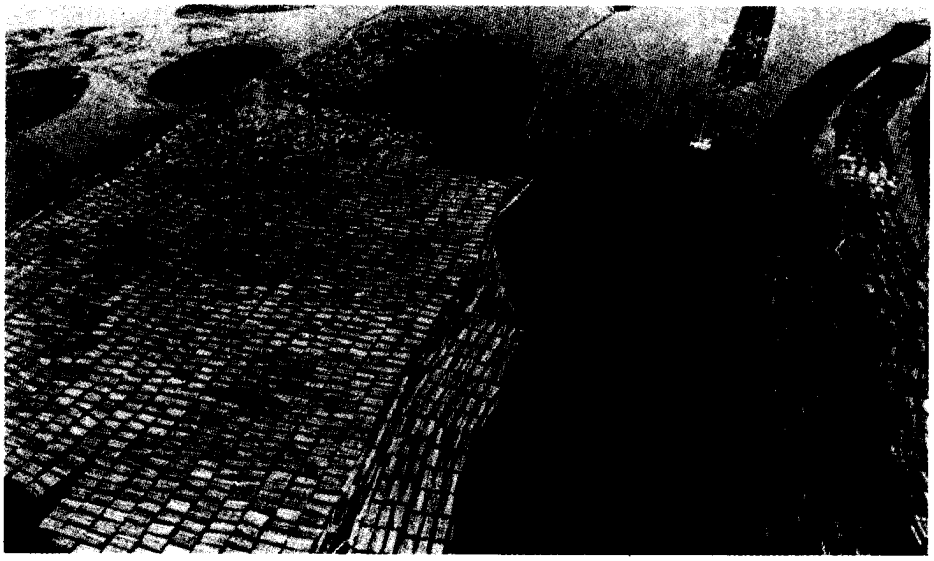
A convoy of wood is floated down the Kem River in the Karelian portion of the USSR. River flotation is cheap and fuel efficient.



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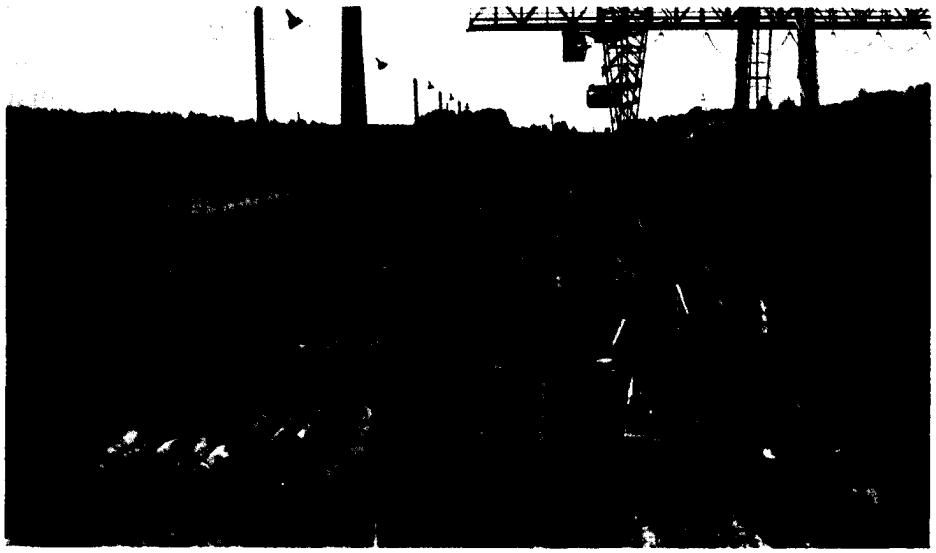
Timber piled up at railroad yards and transfer points because of a lack of rolling stock.



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Loggers haul timber from the forest on "corduroy" or wooden-plank roads.

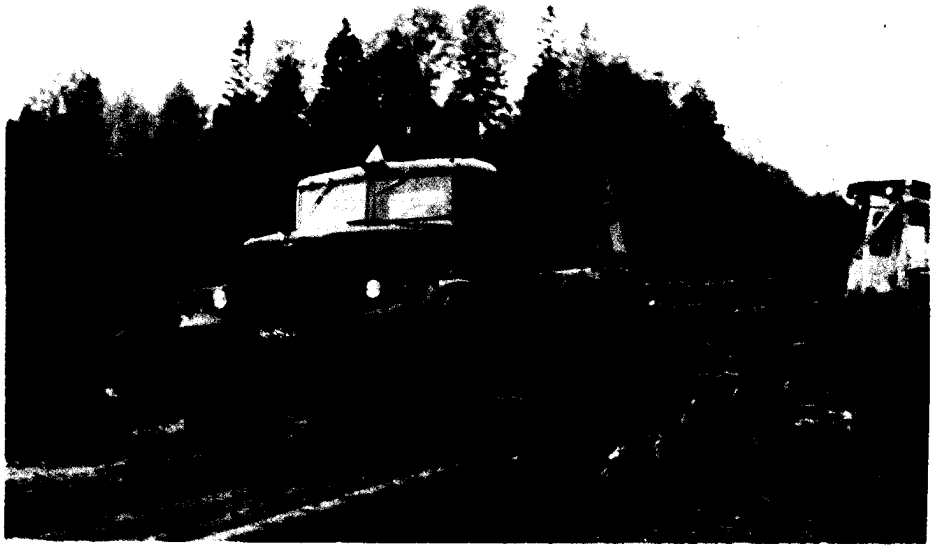

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Figure 3. Transport of Timber

in logging, have been declining, thus decreasing the available labor pool.

The traditional sources of supplementary labor—criminals, university students, Komsomol members, seasonal laborers, and independent workers—have been tapped to maintain an adequate labor force in the forest products industry. They account for as much as one-third of the workers in the logging and sawmilling sector. The Soviets, however, do not seem to have relied on foreign labor to relieve the tight labor supply. The number of imported workers has been small, slightly over 1 percent of the overall timber labor force.

Productivity

Deficiencies in productivity, however, rather than a failure to provide enough labor and capital, accounted for almost all of the poor performance of the forest products industry in the late 1970s. Combined factor productivity of labor and capital changed little in the forest products industry during the late 1960s and early 1970s (see table 5). Beginning in 1976, however, factor productivity broke trend and turned sharply negative. During the 10th Five-Year Plan, the industry posted an absolute average annual decline of 2 percent, one of the poorest performances in all of Soviet industry.

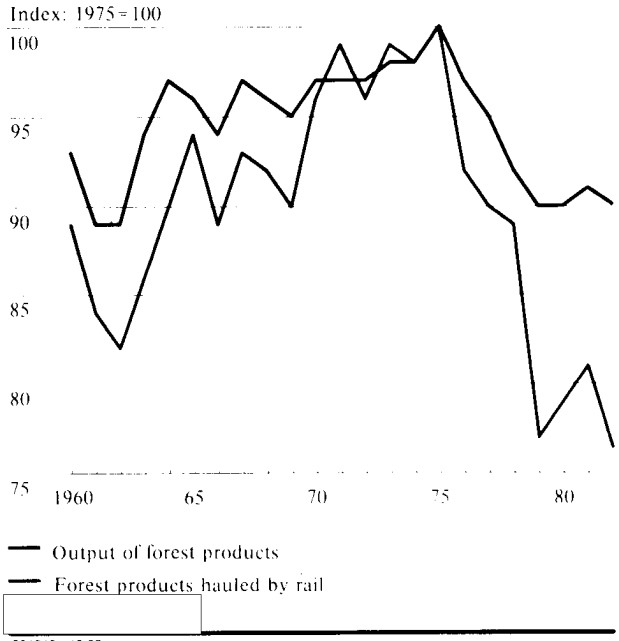
Growth rates for both capital and labor productivity deteriorated in the same period. Capital productivity experienced a rapid decline in the early sixties. The falloff slowed from 1965 to 1970 and then accelerated during the next 10 years. Labor productivity, on the other hand, showed an increase but in smaller increments than in the past. After some resurgence during the Ninth Five-Year Plan (1971-75), labor productivity essentially stagnated over the next five years.

Factors in the Productivity Downturn

The sources of the downturn in productivity are many—and assessing their influence is more art than science. In order of relative importance, the industry has been afflicted by:

- Transportation snarls.
- A raw material squeeze.
- Machinery breakdowns and a lack of equipment.
- Manpower shortages in key occupations.
- Organizational conflicts.

Figure 4
USSR: Output of Forest Products and Forest Products Hauled by Rail



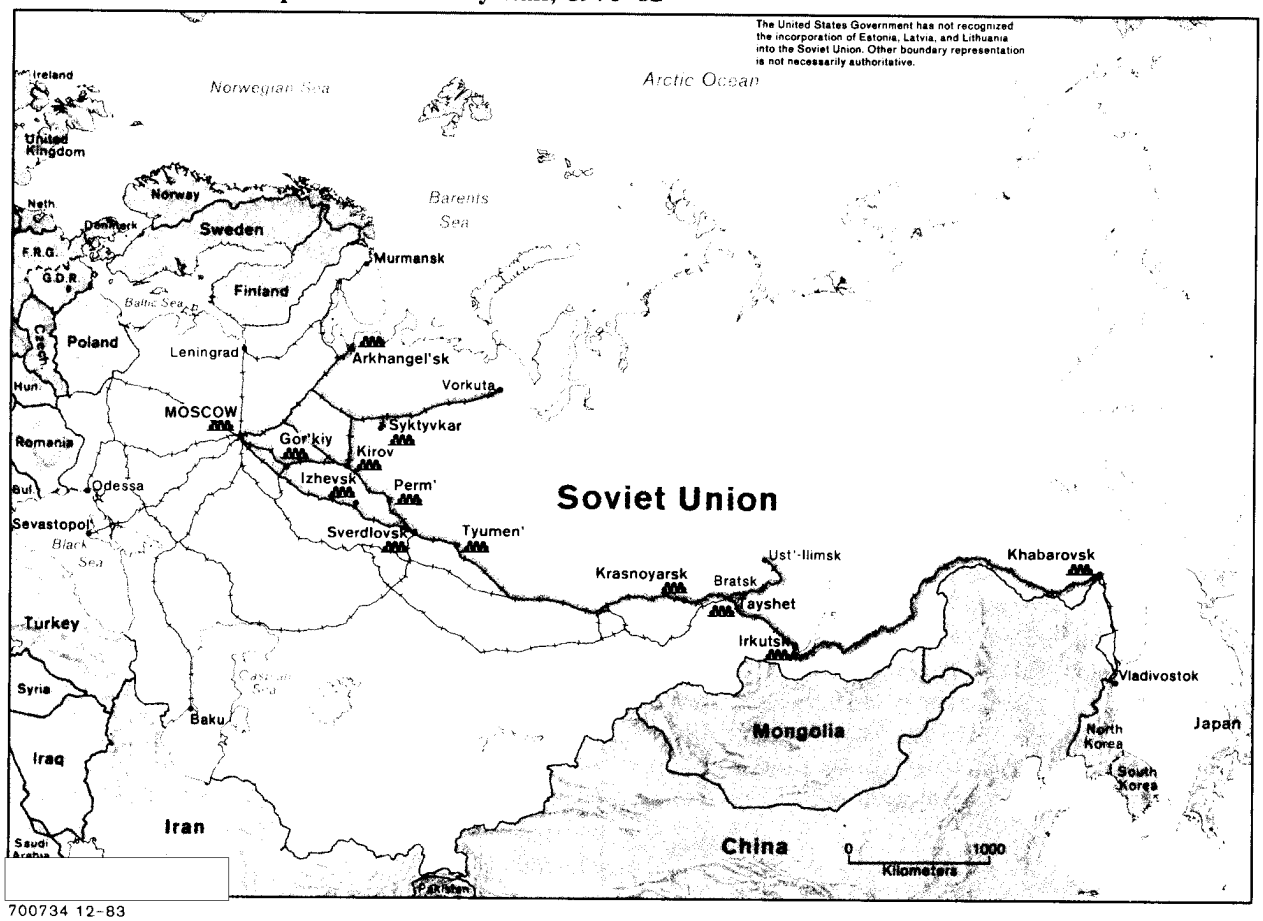
The industry seems to have been overwhelmed by the severity, concurrence, and interconnections of these problems.

Transportation

Rail. Transportation snarls were perhaps the major source of the recent difficulties in the forest products industry (see figure 3 for photographs of timber transportation). Since the mid-1970s the performance of the Soviet railroad system has deteriorated as lines have become saturated. Bottlenecks appeared early in the 10th Five-Year-Plan period and worsened to near crisis in 1979, a year of particularly severe winter weather. The forest products industry, notably the logging sector—the industry's prime supply point—was hit hard.[9]

As figure 4 shows, the decline in the volume of timber hauled by rail is steeper than the decline in timber

Figure 5
Choke Points in Transport of Timber by Rail, 1976-82



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output; this ratio of rail transport to production was roughly 60 percent in 1975 and fell to 52 percent in 1980. In absolute terms, the volume of timber shipped by rail peaked in 1975 at 187 million tons and has fallen steadily since.

The reason for this plunge in rail service seems to have been the priorities set. Timber is neither a major nor a strategic rail customer; its share of total freight tonnage is only about 4 percent. As the demand for rail freight services outpaced growth in railroad transport capacity during the 1976-80 period, railroad officials probably chose to cut back rolling stock earmarked for timber shipments.

Moscow even imposed bans and embargoes on timber traffic as thousands of railcars were diverted from other operations to move grain imports and other critical commodities. No such bans had been necessary during the Ninth Five-Year Plan period. The consequences of these delays and backups were severe for logging operations. Logs piled up at downstream river concentration points and at railroad depots. According to Soviet calculations, the amount of timber that accumulated at these transit facilities was two to five times the amount that the yards were designed to accommodate and considerably higher than the norm of the early 1970s. the bottom layers rotted, a process indicating that the wood had been ignored for two to three years. In some cases, the log decks became so high that they collapsed in the spring when the ground softened and gave way. (See figure 5 for specific areas that had large backups and major delays in timber transport during the 10th Five-Year Plan).

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The narrow selection of railcars compounded the difficulties caused by limited rolling stock. The Soviets elected to apportion a large share of railcar construction to gondolas. A recent US study,[10] for example, estimates that almost 70 percent of timber shipped in the last few years was carried in gondolas. This type of car, however, is not designed for the shipment of bulky commodities such as timber. Moreover, logs were transported in unprocessed form, deflating the volume of usable product by 30 to 40 percent.

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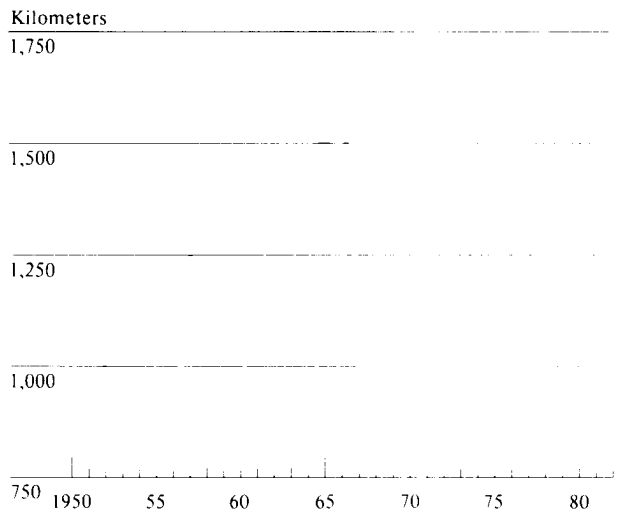
Shoddy work is endemic in the Soviet Union, but this problem seemed to intensify in the rush to put timber back on the tracks. Press reports note some of the problems:

- Wood was not sorted by size or species.
- Haphazard loading was common, and both logs and railcars were damaged by excessive rubbing.
- Rail cars designed to carry logs were not repaired and maintained.
- Derailments occurred when chains holding logs in place snapped.
- Lumber and plywood, not protected against moisture and dirt, were damaged.

The situation was made worse by a shift in the location of the forest products industry. In the late 1970s, while the supply of rail cars for transporting timber products decreased, the structure of demand changed. Processing centers remained in the western parts of the USSR, while logging camps shifted to new woodlands in Siberia, the Urals, and the northern parts of the European USSR. The separation is reflected in the average length of haul. The average stayed fairly stable from 1970 to 1977, but it rose sharply in the late seventies to peak at 1,739 kilometers in 1981—the longest average haul for any major commodity in the USSR (see figure 6). Approximately one-fourth of Soviet timber now comes from these remote areas, leading to transport distances of up to 6,400 kilometers—roughly the distance between Washington and Hawaii (see appendix A, table A-5).

[10] See Wharton Associates, October 1983, *Can Andropov Kickstart the Red Train?*

Figure 6
USSR: Average Length of Haul for Rail Shipments of Forest Products



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Roads. Road networks are virtually nonexistent in lumbering areas, preventing large-scale transfer of logs by truck. Loggers do rely, however, on temporary, secondary dirt, gravel, and ice roads to haul timber from the forests.

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Past neglect of the secondary road system hurt the forest products industry in the 1976-80 period. Harvesting had been extended year round in the 1960s, and, since the road system performed well enough at that time, Soviet planners did not allocate additional capital for road construction. The situation changed in the late 1970s as timber tracts around existing roads were depleted. As the Soviets moved into more remote woodlands, the average initial hauling distance from cutting areas to transit points increased from 10 kilometers in the late 1940s to 45 kilometers in the late 1970s, with the largest increase occurring during 1976-80.

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The Soviets were forced to construct new corduroy (wooden plank) roads. Over 35 million m^3 of timber were diverted in 1976-80 for laying roads—far more than in any other plan period. In the summer [redacted] trucks slid off these poorly designed roads. Moreover, they lasted only for two seasons—mud weighed down the logs and caused them to sink. These difficulties were compounded by the deep snows of the 1979 winter. (Winter is the peak hauling season in logging because spring and summer thaws turn most roads into swamps.) [redacted]

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Water. Aggravating the situation was Gosplan's decision in the 1976-80 Plan to restrict the use of ships for transporting timber and its reluctance to use river flotation of logs. The share of transport via water did, however, increase slightly relative to shipments by rail and road. Timber shipped in raft bundles or on barges accounts for about 12 percent of all river traffic. Water transport handles about half as much timber as rail and is especially important for pulp and paper plants, many of which are situated along navigable waterways. Some 3.3 liters of fuel are used in transporting one cubic meter of timber over 1,000 kilometers via river. By comparison, the Soviets use 12.8 liters of fuel to ship this amount by rail and 56.6 liters to haul it by truck. Why the Soviets did not make more extensive use of waterways as rail transport approached gridlock is puzzling. The prevalence of larch in the timber cut and its tendency to sink might have discouraged a major shift to transport by water, however, despite lower fuel and maintenance costs. [redacted]

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Squeeze on Raw and Intermediate Materials

Transportation bottlenecks during the late 1970s had a ripple effect on raw material flows in the forest products industry. Unlike other Soviet industries—such as steel and chemicals where shortages of raw materials constrained growth—the forest products industry is endowed with almost unlimited resources. The industry instead had trouble conveying wood to and receiving materials from other sectors. [redacted]

Sawmilling was one of the primary casualties of the delays in transportation. On average, sawmills were operated at little more than 80 percent of capacity during 1976-80. Soviet press reports indicate that this unused capacity resulted mainly from shortages of timber. Ironically, while most mills were starved for wood during this period, a few sawmills in Komi ASSR received more than they could handle, and the timber rotted before it could be milled. The structure of the sawmilling sector exacerbated transport difficulties: most mills are small, each with a capacity—about half that of a comparable US facility—that negates any economies of scale for transportation. In addition, they are located in remote areas, far from regular transportation networks, placing additional burdens on the railroad. [redacted]

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Inadequate supplies of materials from other industries also hampered the growth of the forest products industry. According to our evidence, acute shortage of diesel fuel and gasoline hindered logging in more than 15 oblasts in the winter of 1978/79. These shortages were caused partly by severe weather and the resulting increased demand for fuel. Petroleum products are critical for the logging sector because electric power cannot be substituted to run hauling and cutting machinery. [redacted]

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The pulp and paper sector, at the end of the product flow line, suffered most from the raw material shortages. From 1976 to 1980, mill yard inventory fell to 40 percent of the norm. Open press sources noted that many pulp and paper factories were left without reserve stocks of wood, forcing them to rely exclusively on day-to-day deliveries. In some cases, factories had to halt processing temporarily. Even when raw materials were delivered, pulp and paper factories operated intermittently because there were not enough railcars to transport finished goods. According to Soviet press accounts, pulp and paper combines in Karelia were forced to store overflow output outdoors and in production areas; from 1978 to 1980 plants shut down a number of times. We have no evidence of such occurrences during the 1971-75 period. Other articles in Soviet trade journals indicate that the quality of pulp deteriorated following an increase of aged, less healthy trees in the harvest. The poor pulp tore easily when manufactured into paper and led to greater equipment downtime. [redacted]

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Cutbacks in allocations of electric power also restricted operations in the pulp and paper sector. Factory managers complained of brownouts and fluctuations in power, which in turn caused temporary shutdowns and damaged machinery and products. (Pulp and paper factories consume enormous amounts of electrical power and must operate on continuous flow.) According to our evidence, the Soviets expect these electricity cutbacks to interfere with paper production at least until 1987. There is also evidence of spot shortages of the chemicals used in pulp and paper manufacturing during this period.

Capital Stock

The deteriorating condition of capital stock and the difficulties in replacing it have contributed to the decline of the forest products industry (see appendix B), although this is a long-term trend and probably only reinforced the effects of transportation bottlenecks and interruptions in the supply of materials, fuel, and power. Nearly two-thirds of the factories in the industry, according to complaints in the Soviet press, are filled with outdated equipment. According to a US industry expert, several major plants operate on a technological level comparable with that of the United States in the 1930s and 1940s. Most sawmill equipment dates from World War II—some is 35 to 40 years old—and cannot handle the same amount of timber cutting as modern mills. about 4,000 modern sawmills could replace the 35,000 the USSR now employs. These figures reflect the Soviet tendency to keep equipment and machinery in service for unduly long periods. The actual retirement rate in forest products (3.8 percent in 1970 and falling to 3.0 percent in 1981) is much below Western retirement schedules.

The decision to postpone modernization was costly for the forest products industry. Equipment reached a critical stage in its service life during the 1976-80 period. the number of breakdowns and repairs increased significantly compared with that during the Ninth Five-Year Plan. Independent loggers who operated outside the Ministry had even less access to new capital and had to contend with even more breakdowns. Utilization rates for equipment also fell, especially in logging. only three out of every 10 skidding tractors (machines that haul timber) actually removed wood from the forest during this period. Two were assigned to other industries—probably agriculture and construction; another two were in working order but stood idle, probably because of lack of fuel. The remaining three required repairs and were waiting for spare parts. With more flexibility in logging operations, some of the problems in transportation could probably have been ameliorated (see figure 7 for examples of logging equipment). 25X1

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Moreover, the forest products industry managers made poor investment choices with the reduced funds given to them in the 1976-80 period. The expansion of facilities in the European USSR, with its already developed infrastructure would seem to have made more sense. But the Soviets chose a two-pronged investment strategy—construction of large-scale forest industrial complexes at Bratsk and Ust'-Ilimsk in eastern Siberia and renovation of older facilities in the Northwestern and Urals regions. Both endeavors yielded disappointing results. 25X1

Plans indicated that growth of the forest products industry in Siberia would continue to follow the traditional *extensive* path, relying on the region's untapped resources, but growth was hindered by large cost overruns, delays, and coordination problems. 25X1
Difficulties in commissioning Bratsk and Ust'-Ilimsk 25X1
facilities resulted from poor planning, the harsh climate, peculiarities of building on permafrost, delays in the delivery of construction materials, and problems in retaining workers. 25X1

In the northwestern regions of the European USSR, 25X1
the plan to promote *intensive* growth (more productive use of inputs) by upgrading equipment and redesigning facilities did not succeed. Although we do not know all the reasons for the failure, Soviet statements have indicated that production was disrupted in the 25X1
construction process and a number of projects were abandoned in midstream because funds had been used up. Moreover, ministry rhetoric aside, complaints in Soviet trade journals note that most enterprises only expanded capacity by using obsolete technology rather than renovating. 25X1

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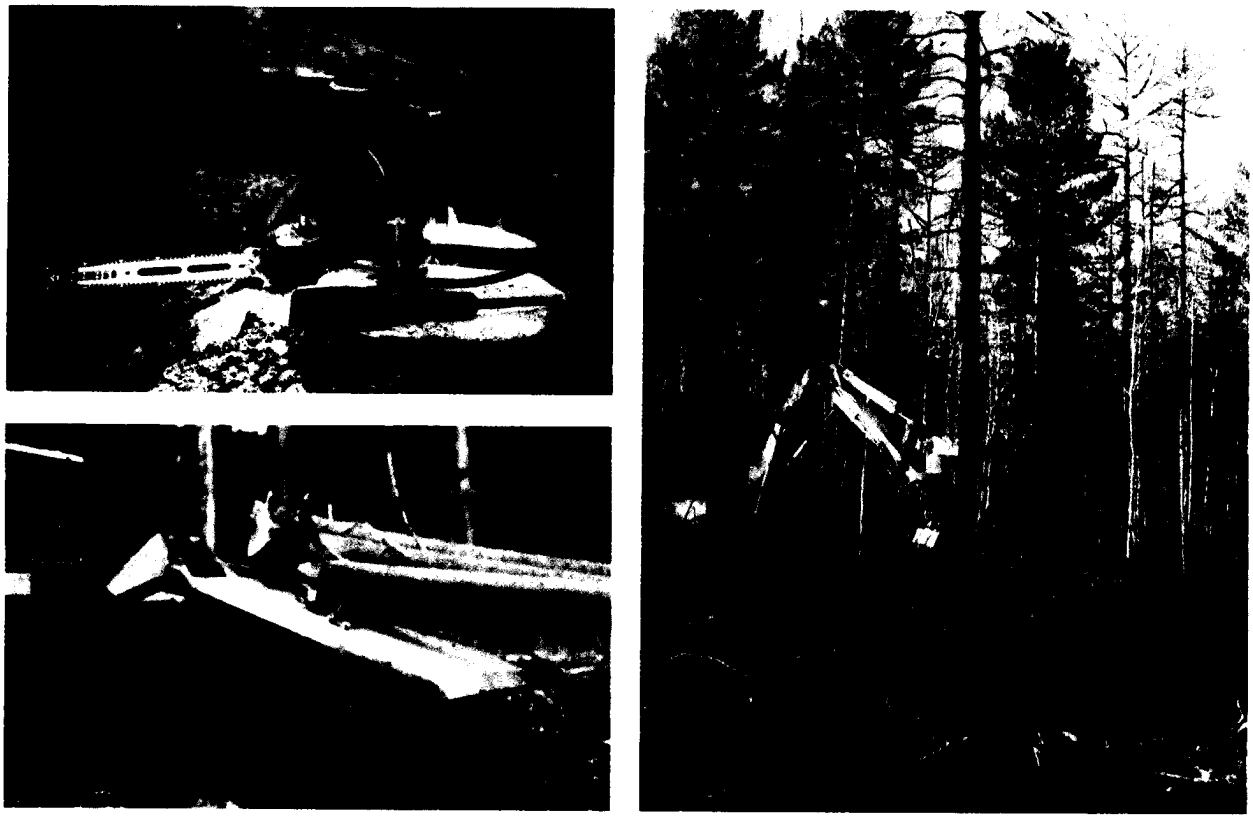

Figure 7. Equipment of the Forest Products Industry
Top Left: A Ural 222 chainsaw. Above: An alternative to the traditional logging chainsaw is a feller-buncher. In one continuous operation, a vice-like cutting wedge fells and then transfers the trees to trucks. Middle Left: Such tracked skidders (or hauling machines) easily become mired in the mud of the forest and remain idle because of the lack of spare parts. Note the choking cables. Left: A P-2 log loader adapted from an agricultural tractor.

For the USSR the traditional sources for state-of-the-art forest products technology have been imports from Finland, Sweden, West Germany, Japan, and CEMA partner Poland. Forest products machinery played a small role in the Soviet import structure—its share of total imports remained 2 to 3 percent throughout the 1970s. According to foreign and US researchers, however, the forest products industry is one of the heaviest consumers of foreign equipment in the Soviet economy, with 20 to 25 percent of its total capital stock originating abroad.

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Because of such significant reliance on foreign machinery, the downturn of timber machinery imports, beginning in 1978, constrained production even further (see table 10). Limits on imports resulted primarily from scarce Soviet hard currency reserves and the reduced trade flows brought about by Western sanctions precipitated by the invasion of Afghanistan.

Table 10
USSR: Imports of Equipment for the Forest Products Industry [a]

Thousand 1981 US $ [b]

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 [c]
101.4	66.0	121.8	141.8	140.9	145.8	182.9	211.6	205.9	186.4	166.0	117.1	118.2

[a] Source: *Vneshnaya torgovlya* for appropriate years.
[b] This series has been adjusted for inflation by a derived CIA index of machinery prices.
[c] Estimated.

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While forest products machinery was not specifically put under embargo, the general strain in relations at that time caused many new timber barter negotiations to be canceled or postponed. Imports from Japan were most affected.

Assimilation of foreign technology, always difficult for Soviet industry, slowed during the 10th Five-Year Plan. For example, the USSR purchased expensive pulp and paper manufacturing machinery for the Bratsk and Ust'-Ilimsk complexes from Finland, its major supplier. This equipment remained idle for two and a half years because of delays in the construction of buildings. Forest products managers were forced to store much of the machinery outdoors, and it was subsequently ruined in the frigid climate. Realizing the technical difficulties in linking Soviet and foreign machinery, the Soviets decided to concentrate the rest of their Finnish purchases on turnkey plants. However, they neglected to train workers; capacity was underutilized and some equipment was damaged.

The Japanese equipment bought during the period was designed for small-scale facilities and a milder climate. The original plan for use in older plants in the northwestern RSFSR was altered, and the equipment was diverted to the large-scale facilities of Siberia, where it did not work well.

Other Factors

Our analysis of the factors already discussed—transportation snarls, raw materials shortages, obsolete equipment, difficulty in commissioning new plants, and the decline in imports—suggests strongly that they were significant elements of the story of declining production in the forest products industry after 1976. The case is not so clear cut for human factors. Low worker morale, high labor turnover, bureaucratic infighting, and poor management have been chronic throughout Soviet industry. The cumulative and compound effects of an unfavorable social and managerial situation in the forest products industry, however, may have contributed to the decline in forest products output and productivity.

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Labor. Loggers, the industry's backbone, have always worked in poor conditions.

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lumberjacks worked 20-hour days during the peak harvest season in late summer and early fall. Although logging is relatively dangerous anywhere, the Soviet accident and injury rate,

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is significantly higher than in Canada or the United States.

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Even though wages have increased substantially since 1965 and are now more competitive with salaries of higher priority sectors, labor turnover has remained high. Ninety percent of lumberjacks in Siberia leave within a few years. Poor housing and lack of public and cultural services are major impediments to labor stability. Some loggers endure the most primitive living conditions, moving from one makeshift camp to the next. The persistent bad conditions probably have discouraged workers, who had hoped to see improvement.

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Meanwhile, the level of training of new forest products workers has actually declined since the early 1970s. Soviet press reports note that only three out of every 100 new workers in the pulp and paper sector had any vocational training, far fewer than in previous plan periods. Many other forest products workers did not even complete secondary school, which suggests that the industry is a dumping ground for poorly educated workers. The skilled personnel drain was most acute for maintenance, repair, and instrumentation jobs.

Organization and Management. Facing mounting difficulties in many forest products areas, Soviet managers struggled to maintain the production plans. In many ways, they became their own worst enemies. While it is not possible to measure statistically the mismanagement and interministerial rivalry during the 10th Five-Year Plan, the level and tone of press complaints indicate these factors affected the decline of output.

In recent years the forest products industry has had no coordinating center; the timber and sawmilling and woodworking sectors were under a different ministry than the pulp and paper sector. With the pressure to halt the decline in production that began in 1975, Soviet sources indicate that managers in these two ministries were quick to blame each other, wasting time on bureaucratic infighting. Moreover, they only reluctantly coordinated efforts, a critical mistake in an industry so closely linked in terms of raw materials supply. According to Soviet press reports, forest products managers did not intervene in intrabranch distribution and could not make on-the-spot decisions to provide raw materials to their own factories. Such inflexibility and uneven use of resources occurred partly because of the strict requirements set by the State Committee for Material-Technical Supply (Gossnab), which was established to replace the ministerial supply system and to prevent the perennial problem of hoarding.

According to US Embassy monitoring of the Soviet press, relationships deteriorated to such a point that in 1980 the Soviets merged the two sectors. Such administrative reshuffling is not new to this industry; the sectors have been separated and joined six times since 1945. We believe some improvement is evident, but major cracks seemed to have been merely papered over. lines of authority are still blurred, and another layer of management, which clogs the decisionmaking process, has been added. Gossnab still interferes in some of the internal management. Most important, Soviet reorganizers did not tackle fundamental problems in communication and ideology that divide the logging and pulp and paper sectors. (Managers in these sectors have different views of the purpose and use of timberlands.)

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Although poor planning and lack of coordination had always been evident in the forest products industry, from 1976 to 1980 the Soviets no longer had slack in the system to absorb mistakes. The vagueness of plan goals also affected production. For example, the logging plan was poorly defined with cutting requirements specified only for coniferous and deciduous trees. Wood processing equipment is geared to one species of trees; using the wrong species decreases the machinery's efficiency and working life.

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Outlook

Production

Soviet plans for the 1981-85 period call for production in the forest products industry to increase by 17 to 19 percent or 3.2 to 3.5 percent annually from the levels achieved in 1980. (Goals for specific commodities are listed in table 11.) Because quotas for independent loggers and sawmillers are not included in the Ministry plan, actual output of roundwood and lumber will be higher; independents account for three-fifths of lumber production and one-fourth of timber harvesting. Most raw wood and forest products will continue to come from the more accessible forests and plants of the European USSR. Cutting this area will increase short-term timber production but will further delay the development of the rich, remote Siberian forests.

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Table 11
USSR: Production Targets for the Forest Products Ministry, 1981-85 [a]

	Actual Output 1980	Planned Output 1985	Total Growth 1981-85 (*percent*)
Timber—industrial and fuelwood (*thousand m³*)	315,700	335,900	6
Industrial timber (*thousand m³*)	259,700	290,700	12
Including:			
Roundwood	226,900	246,300	9
Wood chips	9,700	16,500	70
Lumber (*thousand m³*)	73,600	81,800	11
Plywood (*thousand m³*)	2,022	2,600	29
Particle board (*thousand m³*)	5,118	8,430	65
Fiberboard (*million m²*)	469	666	42
Furniture (*million rubles*)	6,086	7,686	26
Pulp (*thousand metric tons*)	7,123	9,520	34
Paper (*thousand metric tons*)	5,288	6,476	22
Cardboard (*thousand metric tons*)	3,445	4,960	44

[a] Source: V.P. Tatarinov, *Razvitie lesozagotovitel'noi promyshlennosti i transporta lesa: Lesoekspluatatsiia i lesosplav* (Moskva: VNIPIEIlesprom, 1982), p. 33. Data for particle board and fiberboard corrected in accordance with the *Narkhoz*. Quotas for independent loggers and sawmillers are not included in this plan. Actual output, especially for timber and lumber, will be higher.

When we consider the 0.3-percent average annual decline in the last plan period, these goals seem optimistic, indeed, unrealistic. Our best estimate is that by 1985 production of commercial timber by Minlesbumprom and independents will stabilize between 279 million and 284 million m³ while that of lumber will level off between 96 million and 98 million m³. These levels will represent an increase in production but will not approach the 1981-85 plan goals.

The foundation of our estimate of improved performance is the consensus among Western industry experts that there will be a rebound from the sharp decline in output, especially from the abnormally low levels of production in 1982. The strength of the recovery—a growth rate of 1.5 to 3.2 percent for commercial timber and 1 to 2 percent for lumber—depends on weather, transportation, and capital stock. Recent trends suggest that transportation tieups—the major element in renewed growth—will ease to some degree in the rest of the 11th Five-Year Plan. This sector has been given top-level attention in Andropov's discipline campaign, resulting in a housecleaning in the managerial ranks. The Soviets focused on such measures because they never expected bottlenecks on rail lines and still believe the root of the problem to be bureaucratic inefficiency and hoarding of reserves. 25X1

A campaign to involve factories and other shippers in the repair of damaged freight cars has been implemented and will have a positive effect as well. New performance indicators emphasize tonnage of traffic originated rather than distance of haul. These changes will reduce incentives for long hauls and may shift attention to heavier freight-like timber. Further, Gosplan has set more demanding rail schedules to improve turnaround time and has given local officials more autonomy. The opening of major sectors of the Baikal-Amur Mainline (BAM), too, will aid the shipment of timber. These rail lines will cross rich, previously untapped tracts; will relieve traffic congestion; and will direct more timber for export to Pacific customers. 25X1

All problems will not disappear for the railroads, however. Freight car shortages and poor maintenance of rolling stock will still plague the system and thus will put a cap on timber production. The ceiling of 3.2 percent growth in timber production (also the expected growth rate for 1983) reflects the highest estimates of transportation performance and the consequent elasticity of demand for rail services by the forest products industry. 25X1 25X1

Athough improvement in transportation will relieve raw material constraints in other sectors, the effect on lumber production will be diminished because of 25X1

structural weaknesses. The dispersal of milling operations in remote regions far from transportation networks, will dilute the flow of timber to this sector and limit growth.

Further, replacement of obsolete equipment, upgrading of technology, and expansion of capacity will continue and contribute to increased production. Yet the optimistic goals will not be achieved because of low investment and consequent delays. Investment allocations for the forest products industry have not been announced, but we do not believe a share increase is likely for any of the sectors; instead the industry probably will receive less funding because of its low priority. Moreover, we foresee no future large-scale projects for forestry before the late 1980s.

Production of particleboard and fiberboard will probably grow dramatically from the present low levels. To increase production, the Soviets can use wood waste; the investment required is minimal compared with that for highly processed products. The demand for these cheap alternatives to lumber and plywood already exists and promises to be strong in the future.

Growth of output in pulp and paper will be supported by the cellulose and paper mills—whose construction had been delayed—that will begin operation in the 11th Five-Year Plan (see table 12 for projected new capacities in 1983). For example, parts of the large Ust'-Ilimsk mill probably will begin production before 1985. We project that paper and pulp production will increase by about 2.5 to 4.0 percent per year with a possible spurt near the end of the plan period but will fall far short of the plan goal of a 30- to 40-percent increase for the entire Five-Year Plan.

The Soviets also announced goals for increases in labor productivity of 16 to 18 percent during the 11th Five-Year Plan, or about 3 to 3.5 percent a year. Again, we believe the Soviets will not achieve such gains but may see some improvement, partly because of Andropov's discipline campaign.

Production will be hindered by labor shortages resulting from declining birth rates, which will be felt throughout the economy. The forest products industry, saddled with a low priority, will feel the pinch of fewer workers more severely, although the use of forced labor will continue to provide a cushion. Because of manpower pressures, we believe the Soviets will continue to let foreign workers log in isolated areas. Any expansion of this guestworker force will be small, however. Several factors inhibit a significant increase in the use of foreign labor. Bulgaria, the source of most foreign labor, is experiencing its own domestic labor shortages. In addition, Soviet xenophobia is strong, and there exists a real fear that guest workers would cause discontent in the local populace. Though relatively isolated, foreign workers inevitably have some contact with the Soviet population. Consequently, Soviet citizens get first-hand reports of higher living standards in the labor-exporting countries.

Table 12
USSR: Planned Expansion and New Construction of Major Soviet Pulp and Paper Mills, 1983 [a]

Location	Capacity
Belorussia SSR	
Svetlogorsk Pulp and Paper Plant (Expansion)	70,000 tons, pulp
Khaborovsk Kray	
Amursk Pulp & Paperboard Combine (Expansion)	40,000 tons, pulp
Leningrad Oblast	
Svetgorsk Pulp & Paper Combine (Expansion)	140,000 tons, pulp
Syktyvkar Forest	
Industrial complex (new construction)	100,000 tons, paper
Svetogorsk Pulp & Paper Combine (Expansion)	160,000 tons, paper
Amursk Pulp & Cardboard Combine (Expansion)	40,000 tons, cardboard

[a] Source: "New Capacities for 1983," *Lesnaya promyshlennost'*, 29 January 1983, p. 1, col. 1.

More than 70 construction projects are scheduled to come on stream in the timber branch in 1983, but only the major ones are included in the table. The 1983 plans are marked by a sharp reduction in new construction and a concentration of investment on projects already started or nearing completion.

Candidates for new guestworker agreements are Cuba and China. President Castro raised the possibility of sending some 500 workers to cut timber in 1980 when Cuban timber import requirements went unfilled.[11] More recently, the Soviets agreed to the exchange of 1 million m^3 of Soviet lumber for Chinese textiles and foodstuffs of equivalent value. The tentative agreement provided that Beijing supply the labor needed to cut the wood. The use of foreign labor, however, was not mentioned in press reports of the final agreement. We believe the Soviets will allow a small number of Chinese loggers to fell trees in the border areas because of the need to earn hard currency and the desire to improve Sino-Soviet relations. However, we think it very unlikely that a substantial Chinese contingent would be permitted in the USSR even if the strong traditional animosity between the two nations eased.

Exports

Timber is presently the USSR's fifth-largest hard currency earner, following fuels, armaments, gold, and machinery (see appendix A for additional information on exports). Of the roughly 40 million m^3 exported annually,[12] about 16 million are low-value logs and another 7 million are semifinished lumber. The remainder is plywood and other processed board, pulp, paper, and cardboard. In terms of volume, about 75 percent of industrial roundwood exports and 40 percent of lumber exports go to hard currency countries. Long-term reciprocal barter agreements with Finland and satellite countries account for much of the rest.[13] Hard currency earnings from timber sales averaged about $1 billion per annum from 1976 to 1980, peaking at $1.5 billion in 1980 as a consequence of sharply higher world prices. Earnings in 1981, about $1.1 billion, dropped because of generally poor economic conditions and the worldwide slump in forest products production and trade.

[11] In a 1979 Party Congress speech, Castro promised to send 10,000 Cuban workers to the Soviet Union, but he probably made the remark to gain media attention.

[12] All products have been converted to equivalent volume in terms of logs.

[13] As part of guestworker agreements, the Soviets receive a portion of the timber cut by labor-exporting countries. If all this timber were sold to the West, hard currency receipts would be roughly $80 million.

Japan, the major purchaser of roundwood and wood chips, processes the wood into pulp, paper, and lumber for housing. Japanese imports have fallen slightly in the past two years because of sluggishness in housing and the consequent buildup of inventories. Most Japanese trade comes under compensation agreements (see box).

The United Kingdom remains the primary buyer of lumber, although its share of Soviet exports has decreased in the past 20 years. Exports of other wood products such as paper, cardboard, and plywood go mainly to Eastern Europe.

Soviet exports account for only about 4 percent of the world timber trade. The other leading exporters are Canada (19 percent), the United States (13 percent), Sweden (10 percent), and Finland (10 percent). Western scholars, however, have found that Moscow possesses market power in all its major hard currency markets for timber, where it accounts for 20 to 25 percent of all sales. Evidence presented by the academicians shows, however, that rather than manipulating prices in such markets the Soviets have been price takers.

Sales of the two main exports, industrial roundwood and lumber, have consistently amounted to about 5 and 7 percent, respectively, of total domestic production. We expect this ratio to hold. The Soviets will not be able to increase the exportable surplus much by either diverting timber from domestic uses or from other Communist countries. Shortages of wood products already plague many sectors of the economy, interfering particularly with construction projects and packaging. Moreover, most exports to Eastern Europe and Finland are covered by CEMA and long-term reciprocal barter agreements under which the Soviets receive quasi-hard currency goods (that is, goods which would have to be paid for in hard currency if shipments from the countries ceased). Most of the arrangements involve logging equipment from Finland, Poland, and Czechoslovakia. Finnish timber

Compensation Agreements

The major impetus behind the rapid expansion of Soviet trade with the West in the 1970s was the desire to support economic growth in the 1980s and 1990s. The Soviets believed they could best accomplish this by acquiring capital and technology to exploit their rich natural resource base (especially in Siberia) and expand production in key industrial sectors.

To provide the necessary large amounts of foreign exchange, the USSR sought to arrange compensation agreements as a more palatable way of meeting debt repayment obligations. *Under these compensation agreements, Western companies contracted to supply equipment for Soviet projects, and the Soviets obtained guarantees from the firms to purchase Soviet products—often from the output of these projects. Most past barter deals involved natural gas, coal, and chemicals, but some major contracts were written with Japan and France for timber:*

- *From 1969 to 1973, Tokyo exported $166 million in bulldozers and other timber-processing equipment in exchange for 8 million m³ of Soviet timber, wood chips, and pulp.*
- *A 1971 agreement provided for another $50 million in Japanese equipment for Soviet shipment of wood chips and pulpwood.*
- *Under the guidelines of the 1975-79 contract, Japan exported $500 million in forestry equipment and took delivery of 17.5 million m³ of logs and 900,000 m³ of wood products.* 25X1
- *France assisted in the building of a pulp plant near Ust'-Ilimsk in the early 1970s and received $61 million in cellulose.* 25X1
- *Under the terms of the original 1981-86 barter deal, Japan was to receive 10-12 million m³ of commercial timber and 1.2 million m³ of lumber for delivery of forestry equipment. The Japanese granted $950 million export-import bank credits to finance the deal. Because of the current Japanese trade surplus, machinery credits were cut in half for 1983; it is not certain what 1984 negotiations will yield.* 25X1 25X1 25X1

In addition, to the Japanese contracts, the large integrated forest complex at Ust'-Ilimsk was built and equipped collectively by five CEMA countries under a quasi-compensation arrangement. Poland, Bulgaria, Romania, East Germany, and Hungary invested a total of $456 million. Total repayment is set at 205,000 tons of cellulose per year beginning in 1979 and will run for 12 years. 25X1 25X1

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trade amounts to nearly $100 million annually and for the two Bloc countries imports and exports are in the same range.

The Soviets have attempted to increase hard currency exports of more highly processed products, such as paper, cardboard, and plywood. The hard currency earnings from the sale of these products amounted to roughly $24 million in 1981, and future earnings will probably continue to be small. Western customers have resisted Moscow's overtures because of the poor quality of Soviet products. The investment in money and time required to bring production up to Western standards is substantial. The only commodity that will probably bring in more business from the West is particleboard—an inexpensive composite board that is used as a substitute for lumber. There is strong demand for particleboard in the developed countries, and relatively few changes in the production process are needed to satisfy hard currency purchasers. 25X1 25X1

We believe that by 1985, hard currency export earnings will be $1.1-1.5 billion (1981 prices), representing primarily the sale of about 14-16 million m^3 of roundwood and 7 million m^3 of lumber. Underlying our estimate is our belief that the supply of timber for export will increase as production bottlenecks are reduced and domestic consumption remains constrained. Moreover, the Soviets are protected against volatile swings in the market because of long-term trade with Finland and Japan that guarantees significant amounts of exports. We see modest recovery in the importing nations, particularly in Japan where housing and other construction investment has turned upward. However, the range of the estimate reflects our uncertainty regarding the strength and duration of the world economic recovery. Similarly, we project a small price rise because of this increased demand. Timber prices are negotiated in a yearly trade protocol, according to trade officials in the USSR, because the Soviets wish to insulate themselves from wide fluctuations in monthly market price quotes.

By the late 1980s the Soviet position may improve. Western experts expect prices to rebound significantly as the business cycle for the housing-dependent forest products industry turns upward. Moscow can reasonably expect gains in the West European markets as a result of forced reductions in exports by Sweden and Finland—major Soviet competitors. The Scandinavian forests have been overcut and will not be able to sustain the current export volume for long

Substantial increases in export volume may also be directed toward the east—China and Japan. Beijing is deficient in timber resources and is searching for sources of wood, as is evident from the negotiations and recent agreements with both Soviet and American foresters. We think the Soviets will try to make the most of this situation by developing Siberian forests adjacent to the Chinese border and by competing with American companies bidding for the Chinese market. Limitations in Soviet ability to harvest and transport timber and rising Chinese import requirements suggest, however, that the Soviet Union will not completely shut the United States out of the China market.

Prospects for improved earnings with Japan are more tenuous.[14] Japan's present requirements for raw materials have been reduced by recession and structural changes. However, Tokyo's heavy reliance on trade and large existing capacity suggests that Japanese businessmen might be interested in increased timber imports when economic conditions improve. Moreover, Japanese businessmen have traditionally looked to Siberia and the possible development of its mineral and timber treasures. Furthermore, Soviet-Japanese business ties in timber have always been strong, and we believe the Japanese forest products industry probably does not want to damage relations by rejecting new projects completely out of hand. If the Soviets offer attractive prices in the economic agreements, limit politically motivated preconditions, and push to meet Japanese quality standards, Moscow could capture a large share of future Japanese purchases. Perhaps the most likely future deals would involve the construction of pulp and paper plants on Sakhalin during the 12th Five-Year Plan. This project has been planned for some time, but Moscow and Tokyo alternately rejected construction during the 1970s because of domestic considerations. Another project that might be resurrected is a forest complex at the Angara Yenisey river basin—an unexploited area of some of the world's best timber. If Moscow offers better terms, Tokyo, as well as Finland, could become partners in this project, although Tokyo's signals indicate it would prefer a smaller scale program.

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the Soviets could boost production and hard currency earnings quickly by concentrating on lumber and wood chips. By investing comparatively small amounts in kiln driers and packaging for lumber, the Soviets could undercut the prices importers would pay to reprocess the whole logs. To accommodate Japanese requests for wood chips, Moscow has chipped good quality roundwood, while some one-half million m^3 of wood chips and mill residue were discarded as waste. By purchasing some

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separating machinery, the Soviets could earn hard currency from the sale of this valuable byproduct, save the roundwood for processing of other commodities, and use an enormous amount of waste materials. We see no indication, however, that Moscow is moving in these directions, most likely because of a perception that composite materials are more profitable and that waste is unimportant.

Year 2000

Experts from the Food and Agriculture Organization of the United Nations, the World Bank, and the forest products industry foresee long-term trends that could enhance the position of the Soviet forest products industry. They point to the accelerating rate of depletion of global forests and are particularly alarmed by the rapid rate of deforestation of timber areas in the tropics (tropical forests are usually comprised of hardwood trees). Although not all forestry analysts agree, many believe that "the tropical forest ecosystem as we know it will virtually disappear from the face of the earth by the end of the 20th century."

If such depletion does occur, the scarcities of hardwood will not be permanent. Unlike coal and oil, trees are a renewable resource and once replanted can grow back in about 40 to 80 years. During the regrowth period, however, the Soviets could reap substantial benefits. The USSR's almost unlimited supply of coniferous stock, though not a perfect substitute for hardwood, might capture new markets and would enjoy an almost certain price rise.

The main Soviet competitors will be the United States, which has vigorously practiced forest management and thus can count on a significant stable yield for the next 40 years, and, to a lesser extent, Canada. Ottawa will be unable to match Soviet and American production because of present overcutting in critical regions.

Demand will probably rise most for raw timber and wood chips—a situation that will most benefit the USSR because of its enormous reserves and its weak processing sector. Customers in the Third World and China will rely on wood for fuel and construction and those purchasers in the industrial countries, most notably Japan, have large capacities to process timber themselves. To take advantage of the favorable market, Moscow will need to improve transportation. A good road network will be necessary to exploit rich inaccessible timber tracts in Siberia and the Far East; the agenda of priorities for all transport will have to shift so that wood can be hauled to port facilities. The development of the BAM and settlement—albeit slow—of the Far East suggests that these will not be critical constraints. Furthermore, the Soviets will have to market timber aggressively, step up sorting and grading procedures, and perhaps even increase chemical treatment of wood. The most expensive, yet potentially most lucrative, avenue Moscow can take to improve its market position is to expand technology for the use of larch. Under this favorable scenario, hard currency receipts from timber sales could triple or even quadruple.

Thus, Soviet forestry and forest products may be a Cinderella industry, given a low priority now but destined for much greater attention.

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Appendix A

Tables, Charts, and Maps

Table A-1
USSR: Production Costs in Timber Extraction [a] [b]

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Production cost (*rubles per m³*) all timber, including fuelwood	12.14	12.13	12.42	13.16	13.80	13.25	14.02	14.72	15.68	16.12	16.60	16.81
Commercial timber	15.65	15.64	15.98	16.75	17.68	16.73	17.86	18.73	20.05	20.90	21.39	21.72
Percentage change in costs all timber, including fuelwood		−0.1	2.4	6.0	4.8	−4.0	5.8	5.0	6.5	2.8	2.9	1.3
Commercial timber		−0.1	2.1	4.8	5.5	−5.4	6.7	4.9	7.0	4.2	2.4	1.5
Soviet official cost increases—for timber		1.0	0.7	1.8	3.6	0.8	1.7	1.6	2.4	2.8	1.5	1.5

[a] Source: *Narkhoz* for appropriate years. These increases in extraction costs correspond primarily to the development and exploitation of timber tracts in Siberia and the Far East; the costs include an artificial 12-percent charge on fixed capital.

[b] *Methodology for Calculating Changes in Cost of Production.*

A series for capital stock was derived by converting the fixed capital growth indices for forest exploitation (found in *Narkhoz 1974*, p. 196 and *Narkhoz 1980*, p. 141) into the ruble value of machinery and equipment. The benchmark figure for this capital stock series was the 1972 capital stock survey (*Narkhoz 1974*, p. 66).

The capital stock series was multiplied by the percent of amortization (*Narkhoz* for appropriate years) charged per annum to obtain the ruble value of the amortization charge.

The amortization charge in turn was divided by total roundwood production for each year to derive an amortization charge per cubic meter of roundwood produced. (A second series was calculated, substituting commercial timber production. Commercial timber excludes wood used for fuel.)

The charge per unit was divided by its percentage of timber production's manufacturing cost for each year to produce an approximate cost in rubles for 1 m³ of wood. These data were found in *Narkhoz* for 1970-78. Estimates were made for 1979-82 because data were omitted in more recent editions.

A capital charge was added to the base manufacturing cost to obtain a cost of production (rubles/m³). This capital charge was derived by multiplying the assumed interest rate (12 percent) by the derived stock figure for each year and dividing this figure by the total physical units produced each year. Again, two series were used, one for all timber and another for commercial timber.

The percentage changes in cost of production were translated into a derived index that can be compared with the official index. The difference between the two indices reflects the fact that official Soviet cost figures include only amortization (or depreciation) as a charge for the use of fixed or working capital. A synthetic interest charge of 12 percent, the convention used by Western scholars, was incorporated to approximate capital's contribution.

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Table A-2
USSR: Planned and Actual Growth Rates for the Forest Products Industry [a]

Percent

	Average Annual Growth Rate						Average Annual Growth Rate						Average Annual Growth Rate			
	1971-75	1971	1972	1973	1974	1975	1976-80	1976	1977	1978	1979	1980	1981-85	1981	1982 [c]	1983 [d]
Planned [b]	5.8						4.3						3.4			
Reported	5.2	6.1	4.7	4.5	5.2	5.7	1.6	2.3	3.0	1.5	−1.4	2.2		3.6	3.5	4.0
CIA index of Soviet production [c]	2.6	2.8	2.0	2.7	1.8	3.6	−0.3	−0.1	0.3	−0.4	−2.9	1.7		2.3	0	3.4

[a] Sources: Planned growth rates were either directly reported or were calculated based on a sample of reported data; reported growth rates were found in or calculated from data given in *Narkhoz*.
[b] Planned growth rates are not always announced for individual years.
[c] The official rate of growth reported by the Soviet statistical authorities is biased upward because gross output weights are used and thus double-counting occurs. In addition, official data allow disguised inflation to enter the indexes under the guise of new product pricing, so this inflation is counted as real growth. The CIA constructs synthetic indexes based on a sample of commodities in physical terms, which are aggregated with fixed prices and value-added weights. *Value added* is gross output less intermediate inputs consumed. More specifically, value added includes profits, wages, depreciation, and other payments to the factors of production plus indirect business taxes and subsidies (as a negative income).
[d] Preliminary estimates.

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Table A-3
USSR: Annual Growth of Output by Sector in the Forest Products Industry [a]

Percent

	Logging	Sawmilling and Woodworking	Furniture	Pulp and Paper	Wood Chemicals		Logging	Sawmilling and Woodworking	Furniture	Pulp and Paper	Wood Chemicals
1960	−4.7	1.8	18.4	4.5	1.5	1972	−0.3	0.1	8.9	4.5	−0.6
1961	−3.8	−0.7	15.8	6.0	3.3	1973	1.9	−1.7	9.7	5.9	10.7
1962	0.8	0.6	12.5	7.0	2.1	1974	−0.3	−1.0	8.3	4.3	7.2
1963	4.6	1.9	10.0	5.6	1.0	1975	2.7	1.3	7.8	4.9	3.6
1964	3.8	4.0	6.1	7.5	9.0	1976	−3.5	−2.6	5.7	4.9	−1.1
1965	−1.3	1.1	7.8	12.6	6.7	1977	−1.8	−2.8	6.5	1.9	3.2
1966	−1.0	−3.0	7.6	10.7	−3.2	1978	−3.9	−2.9	6.1	−1.7	0.3
1967	4.5	2.2	11.9	8.2	2.1	1979	−3.5	−6.1	3.0	−5.8	0.8
1968	0.4	0.9	10.1	5.0	−2.7	1980	1.6	−1.0	5.5	0	0.1
1969	−1.4	2.1	7.1	5.4	−9.2	1981	0.1	0	6.8	2.6	0
1970	3.8	3.8	9.0	6.9	−8.5	1982	−1.3	−0.7	4.9	0.1	0
1971	−0.1	2.0	9.3	5.5	−3.1						

[a] Source: CIA index of Soviet production.

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Table A-4
USSR: Distribution of Investment Funds by Activity in the Forest Products Industry [a]

Percent

Activity	1976	1977	1978	1979	1980
Total	**100**	**100**	**100**	**100**	**100**
Reconstruction	11.1	8.6	8.2	3.8	6.7
Technical restructuring of capacity	16.5	17.6	16.2	17.5	20.8
Expansion	11.8	13.4	20.2	29.6	25.1
Construction of new mills and plants	22.3	20.4	18.2	18.2	15.4
Maintenance of existing capacities (repair)	30.9	31.7	29.6	22.8	25.8
Equipment not included in the original construction projects	6.6	7.5	6.9	7.3	5.2
Feasibility studies and design of projects	0.8	0.8	0.7	0.8	1.0

[a] Source: *Narkhoz.*

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Table A-5
USSR: Timber Transported by Rail

	1960	1965	1970	1975	1976	1977	1978	1979	1980	1981	1982
Tonnage hauled (*million metric tons*)	165.6	175.1	178.8	187.0	173.2	168.4	165.9	144.8	146.9	151.6	142.8
Freight traffic (*billion ton kilometers*)	229.7	263.0	294.5	307.7	284.8	277.1	282.1	242.6	251.8	263.7	247.2
Average length of haul per ton (*kilometers*)	1,387	1,502	1,647	1,645	1,644	1,645	1,700	1,675	1,714	1,739	1,731

[a] Source: *Narkhoz* for appropriate years.

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Table A-6
USSR: A Comparison of Annual Allowable Cut, Actual Cut, and Mean Annual Increment in Logging [a]

	Allowable Cut (*Million m³*)			Actual Cut (*Million m³*)			Utilization of Allowable Cut (*Percent*)			Total Mean Annual Increment (*Million m³*)	Utilization of Mean Annual Increment (*in percent*)
	Total	Conifers	Hardwoods	Total	Conifers	Hardwoods	Total	Conifers	Hardwoods		
USSR											
1970	625.6	397.8	227.8	343.2	260.6	82.6	54.9	65.5	36.3	844	47.7
1975	640.1	407.2	232.9	353.1	265.1	88.0	55.2	65.1	37.8	881	46.7
1980	638.4	404.6	233.8	327.5	238.8	88.7	51.3	59.0	37.9	891	43.5
Northwestern Europe and the Urals											
1970	255.1	143.3	111.8	225.5	154.2	71.3	88.4	107.6	63.8	279	95.6
1975	253.9	141.7	112.2	223.0	149.4	73.6	87.8	105.3	65.6	292	91.8
1980	250.9	138.3	112.6	198.5	127.5	71.0	79.1	92.2	63.1	324	74.1
Siberia and the Far East											
1970	370.5	254.5	116.0	117.7	106.4	11.3	31.8	41.8	9.7	565	22.5
1975	386.2	265.5	120.7	130.1	115.7	14.4	33.7	43.6	11.9	589	24.4
1980	387.5	266.3	121.2	129.0	111.3	17.7	33.3	41.8	14.6	567	26.1

[a] Source: M. M. Drozhalov, "Lesopol'zovanifu-effektivnost' i kachestvo," *Lesnoe khoziaistvo*, No. 7, (1982) pp. 36-38.

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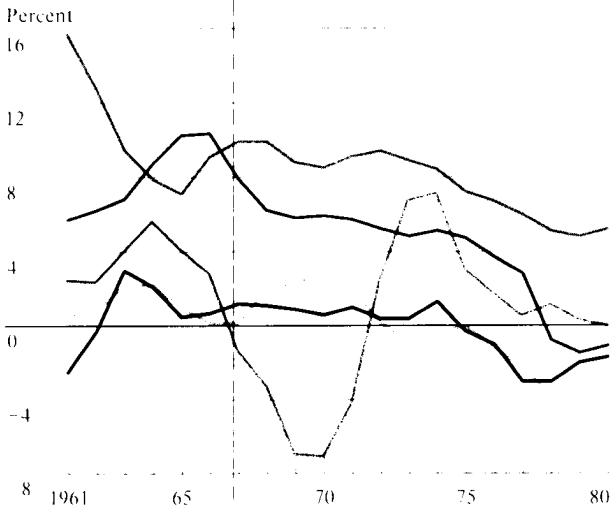
Figure A-1
USSR: Three-Year Average Annual Growth in the Forest Products Industry[a]



[a] Growth rates are a moving average over a three-year period to smooth out fluctuations and rebounds.

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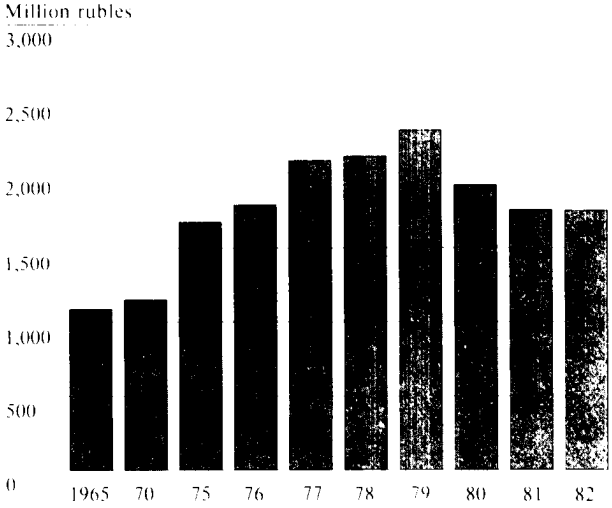
Figure A-2
USSR: Unfinished Construction in the Forest Products Industry[a]



[a] Does not include collective farms.

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Figure A-3
Forest Resources in the Soviet Union

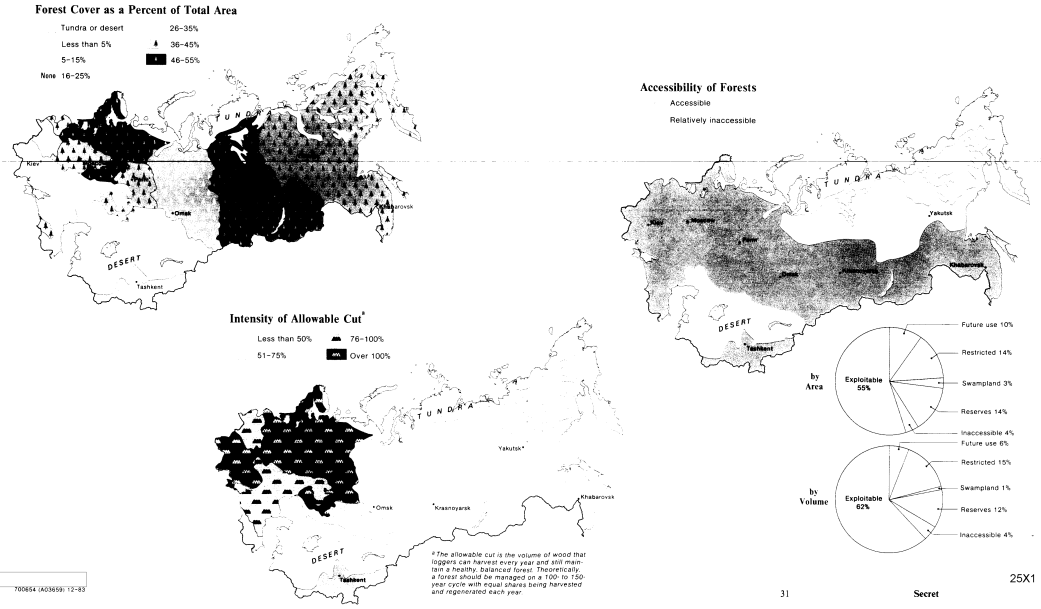

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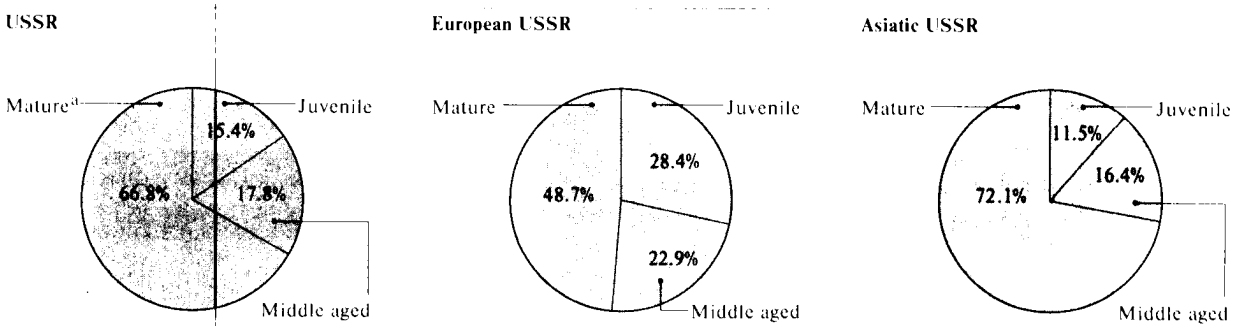
Figure A-4
USSR: Age Structure of Forests



[a] Refers to the oldest trees, which are also ready for harvest, although most have passed the prime time for felling and have lost some commercial value.

25X1

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Figure A-5
USSR: Species Composition

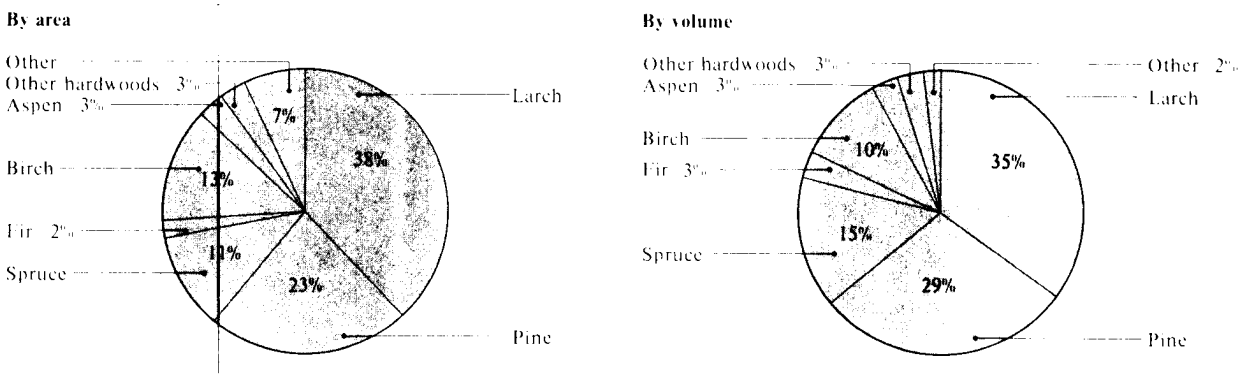

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Figure A-6
Leading Producers of Timber, 1981

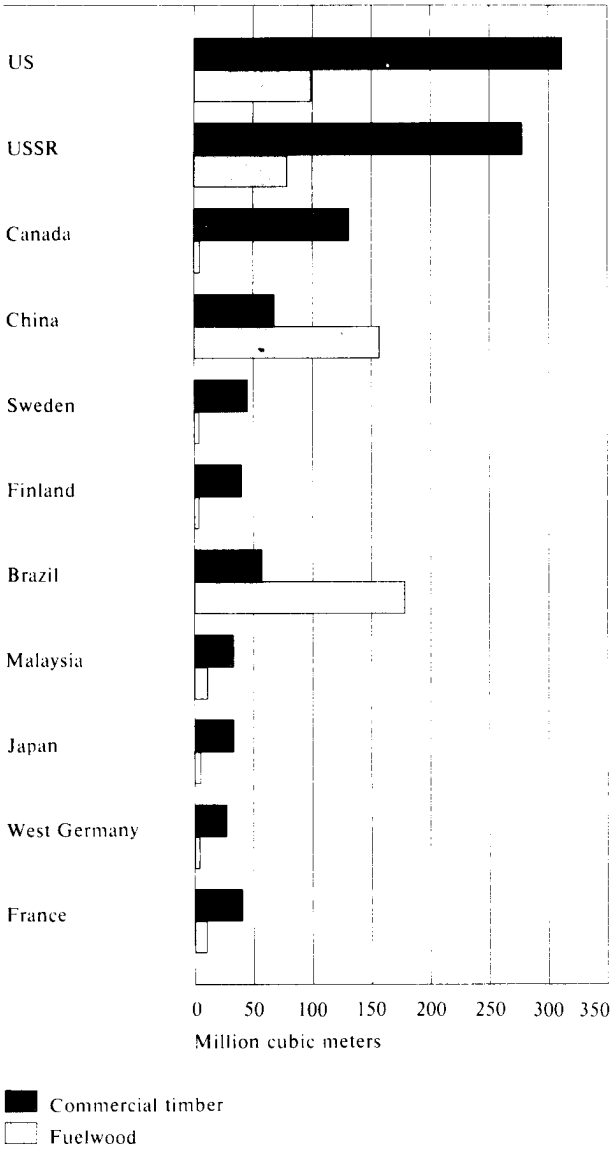

Figure A-7
Leading Exporters of Commercial Timber, 1981

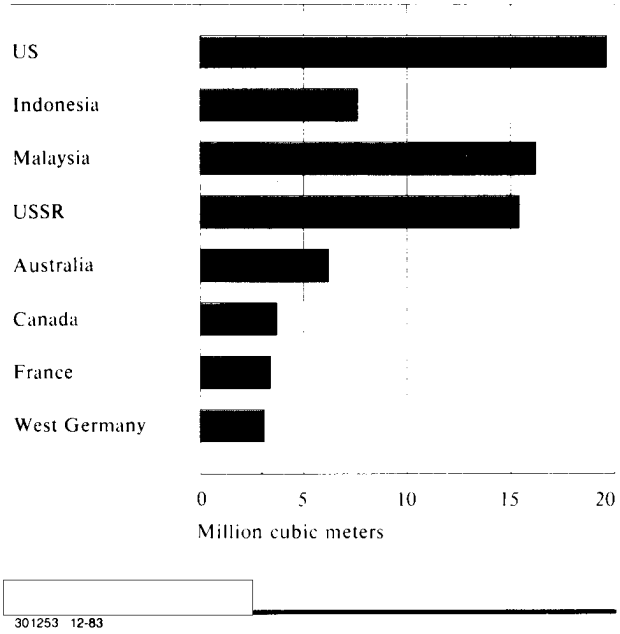

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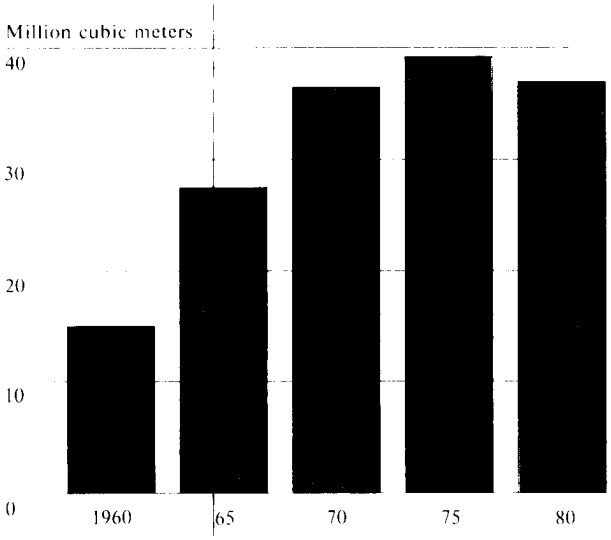
Figure A-8
USSR: Exports of Forest Products, 1980[a]



[a] All products have been converted to cubic meter equivalents.

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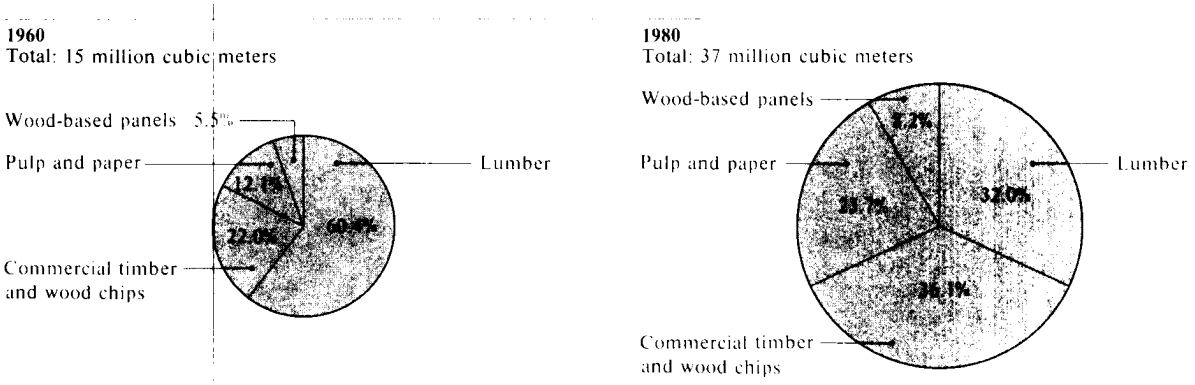
Figure A-9
USSR: Composition of Forest Products Exports[a]



[a] All products have been converted to cubic meter equivalents.

25X1

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Appendix B

Specific Problems With Machinery, Equipment, and Technology

Soviet press accounts are the main source of information on the use of machinery, equipment, and technology in the forest products industry. Examples are discussed in the following section.

Pulp and Paper

Problems with pulp and paper machinery begin at the initial phase of production—debarking. Wood bark appears as dirt in finished paper so it should be removed when processing most grades of pulp. Because debarking also boosts sawmill efficiency, logs should be stripped before they are cut into boards and planks. Yet Soviet press accounts in 1975 noted that only 40 percent of timber had gone through this process, a figure that indicates a shortage of machinery. There is no indication that this situation has improved. Moreover, the Soviets use some machinery that is obsolete and cumbersome, including chain debarkers, which are uneconomical because they strip wood together with bark. (American companies discontinued this method 20 years ago.)

After debarking, logs designated to become paper or pulp are put onto chipping machines where large rotating disks reduce them to small chips. In some plants, chipping machines stand idle because there are no blades available. According to Soviet sources, in 1979 only one-third of the needed blades were supplied.

The chips, now called cellulose, cook in steam boilers or digesters, are washed, and pass through filters and rollers that remove the water and slivers. Again the capital stock is inadequate. Digesters are badly worn. There are neither enough evaporator units nor enough of the various rollers for the filtering machines.

If this thickened pulp is to become white paper rather than cardboard, bleaching follows. This process represents the biggest bottleneck in the entire system:

- To conserve funds, the Ministry of Timber, Pulp, Paper, and Woodworking purchased inadequate filters from the Ministry of Chemical Machinery but did not buy backup pumps or screens. Consequently, the entire flow of production must be stopped when these simple mechanisms need repairs. 25X1

- The pipelines in bleaching installations are not designed to withstand the necessary levels of pressure and often burst. As for many other machines, parts are hard to replace. They must be custom made, because standard new parts are usually a different size and weight.

- Bleaching towers are placed outdoors and not in protected, heated shelters. Chemicals in the bleaching shops often corrode the filters and drums of the washing units because the wrong alloy of steel was used. 25X1

After bleaching, the washed and rethickened pulp is carried through a series of rollers and becomes paper. With high-speed papermaking machinery, effective operation depends on frequent inspection and maintenance, which is frequently neglected. 25X1 25X1

Logging

Technology in the logging sector is also inadequate. Soviet chain saws 25X1 are substantially inferior. On average, Russian chain has only 25 percent of the life of chain manufactured in the United States. Much Russian chain is not 25X1 usable at all—because the link holes are not uniformly drilled, binding, rapid wear, dullness, and breakdown result. Most skidders (hauling machines used only in the forest), have choking cables rather than the grapples on Western machines. These devices slow down production because an extra worker, a chokerman, must be employed to operate them, and they 25X1 permit only a small bundle of trees to be moved. 25X1

The lack of spare parts and insufficient repair work restrict operations of other logging equipment, particularly tracked vehicles that have many parts. For

example, according to a 1980 Soviet trade journal, a logging truck worked an average of only 148 days and a skidding tractor 108 days out of 270 because of shortages of spare parts. The situation was even worse in 1981 when logging trucks were used only 51 percent of the time. 25X1

The Soviets rely on tracked vehicles, spinoffs from military technology, rather than wheeled vehicles. Wheeled equipment is preferred by Western foresters because it requires less metal to build and is more productive and maneuverable. The Soviet tracked vehicles easily become mired in mud when under full load—one-third of the forested area of the USSR is swampy. Tracked vehicles are also abused. Machines are overloaded and the center of gravity is thrown off when large, old trees are harvested. As a consequence, traction and maneuverability are reduced, and the machines are strained to their limits. There is no indication that the Soviets are preparing to make the major change over to wheeled vehicles. In any event, Moscow must make do with tracked equipment for a considerable period because converting production to wheeled equipment would take 10 years or more. 25X1