

Romanian pulp and paper industry

Current status and future prospects

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The Romanian pulp and paper industry has declined steadily since the fall of Communism. Can it recover in a free market?

Romania, like the rest of Europe, has been manufacturing pulp and paper for about 200 years. The Romanian industry currently consists of 22 companies, most of them owned by the state, along with six joint ventures. These 28 enterprises comprise a research-and-development institute for the pulp and paper industry, a foreign trade company, a company that collects and transports raw materials (recycled fiber, fiber from annual plants), 10 integrated pulp and paper manufacturers, and 15 companies manufacturing paper and board.

Most of the manufacturers are using imported equipment that has not been upgraded in the past decade. The deterioration of this equipment is reflected in lower yields, higher specific energy consumption, reduced product quality, and unacceptably high levels of pollution.

Romanian pulp and paper industry, 1989–93

The utilization of production capacity has declined progressively since 1985. However, the decline accelerated markedly in 1989, when the industry underwent a sudden transition from a stagnant, state-controlled economy to a free-market economy. This metamorphosis was accompanied by a drastic reduction of material, financial, and energy resources, resulting in steep cutbacks in existing production capacities. By the end of 1993, only nine pulp-production lines and 26 paper machines were still operating. Pulp production was slashed by 50% in the early 90s. By 1993, it had fallen to 30% of the level produced in 1989, as seen in Table I. Paper and board production in 1993 was only 42% of the level produced in 1989.

Product quality has also declined because of the age and deterioration of the production equipment. The low product quality has led to a significant increase in imports of paper and, especially, board. On the other hand, some of the mills with up-to-date equipment have managed to improve the quality of their bleached packaging papers, newsprint, and printing and writing papers. Demand for these products increased by about 40% in the first half of 1994, compared with the same period in 1993.

Romania has the lowest paper consumption in Europe. In 1993, the average per capita consumption of paper in Romania dropped abruptly from 30 kg to 14 kg. This is much lower than consumption in developed countries (130–300 kg) and is even lower than the world average consumption of 45 kg.

The mix of paper and board production in Romania differs significantly from both the worldwide mix of production and the mix reported in Western Europe. Romania produces a significantly higher amount of papers with a high pulp content, mainly from softwood. Consequently, production of paper from high-yield pulps is much lower than in other countries. As seen in Table II, combined production of newsprint and printing and writing papers represented 25% of Romanian production in 1989. In contrast, these grades represented 52% of the production in Western Europe.

Consequently, Romanian production of high-yield pulps—mechanical pulp and TMP (thermomechanical pulp)—was much lower than in the rest of the world, as seen in Table III. In contrast, production of dissolving pulps—an energy-intensive and polluting process—is much higher than the worldwide average.

In the first four years of the transition economy (1989–93), the pulp and paper industry has undergone some favorable modifications from the standpoint of raw-material usage and energy consumption:

- The weight of newsprint has increased from 10.2% of the nation's output to 19.4%.
- Production of solid fiberboard has decreased.
- The weight of dissolving pulp has been curtailed from 18.6% to 1.5% of the nation's output.

Raw materials and energy resources

Wood supply

The volume of wood harvested annually is established by the Parliament, which seeks to balance the needs of industry with

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I. Production of pulp, paper, and board, 1989–2000

	<i>Actual</i>			<i>Predicted</i>			
	<i>Production, 10³ tons</i>		<i>1993/1989,^a</i>	<i>Production, 10³ tons</i>			<i>2000/1989,^b</i>
	<i>1989</i>	<i>1993</i>	<i>%</i>	<i>1994</i>	<i>1996</i>	<i>2000</i>	<i>%</i>
Pulp	662.1	197.2	29.8	258.2	339.8	398.0	60.1
Paper and board	<u>692.9</u>	<u>288.3</u>	<u>41.6</u>	<u>323.0</u>	<u>407.0</u>	<u>600.0</u>	<u>86.5</u>
Total	1355.0	485.5	35.8	581.2	746.8	998.0	73.6
Corrugated fiberboard	115.3	44.8	38.8	50.1	68.3	87.3	75.7

^a Production in 1993 compared with production in 1989
^b Predicted production in the year 2000 compared with production in 1989

II. Mix of paper and board production, 1989–2000, %

	<i>Worldwide</i>	<i>Western Europe</i>	<i>Romania</i>							
	<i>1989</i>	<i>1989</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1996</i>	<i>2000</i>
Newsprint	13.8	15.0	10.2	12.8	15.2	16.9	19.4	17.9	19.6	15.8
Printing and writing papers	28.4	37.0	15.0	16.2	13.6	14.2	11.5	17.6	17.6	17.3
Other grades	<u>57.8</u>	<u>48.0</u>	<u>74.8</u>	<u>71.0</u>	<u>71.2</u>	<u>68.9</u>	<u>79.1</u>	<u>64.5</u>	<u>62.8</u>	<u>66.9</u>
Total	100	100	100	100	100	100	100	100	100	100

the need to preserve the environment. The allotment of wood for the pulp and paper industry decreased from 4.37 million m³ (26% of the total wood harvest) in 1988 to 1.8 million m³ (18.7% of total wood harvest) in 1991. Table IV shows the deep cuts in the wood allotment for the pulp and paper industry between 1991–93. The immediate consequence has been a decrease in pulp production from 662,000 tons in 1989 (Table I) to 305,000 tons in 1991 to 197,000 tons in 1993 (Table I).

Nonwood fiber supply

Romania has two mills that produce straw pulp. During the last decade, these mills have encountered difficulties in obtaining high-quality straws, primarily because of an inadequate system for harvesting, collecting, and delivering the straw. Given the poor quality and high price of the available straw, production costs for straw pulp are much higher than for hardwood pulp. Mills have responded by substituting pulp from poplar and willow in place of straw pulp.

Recycled fiber supply

Because consumption of paper products in Romania is low, the ratios of recycled-fiber utilization and recovery are also low. Table V shows the actual and predicted consumption of wood and recycled fiber between 1989 and 2000. Recycled fibers are

not sorted, with nondeinked papers used in the manufacture of low-quality papers and boards.

Energy resources

Pulp and paper production are energy-intensive processes, and mills worldwide strive to reduce consumption of thermal and electrical energy. Mills obtain thermal energy, and a portion of their electrical energy, by firing both primary fuels (methane, oil, coal) and secondary energy resources (spent liquors, wood bark, sawdust). Table VI shows actual and predicted consumption of energy between 1989 and 2000.

Modernization and reorganization

Criteria and objectives

The plan to reorganize and modernize the Romanian pulp and paper industry is based on several studies. A broad internal study was led by Cephart SA Braila in collaboration with other Romanian companies. Two other organizations—one from Finland (Jaakko Poyry) and the other from the United Kingdom (Parsons & Whittemore Lyddon Ltd.)—have undertaken similar studies in cooperation with the Technical University of Jassy and with Romanian producers of pulp and paper. These studies have identified strategies for reorganizing

III. Mix of pulp production, 1989–2000, %

	<i>Worldwide</i>	<i>Western Europe</i>	<i>Romania</i>							
	<i>1989</i>	<i>1989</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1996</i>	<i>2000</i>
Chemical pulps	68.1	64.5	70.8	69.5	70.3	76.6	79.1	76.2	74.9	74.6
Dissolving pulps	2.0	3.2	18.6	16.8	14.7	6.6	1.5	5.4	10.9	10.9
Mechanical and TMP	<u>30.0</u>	<u>32.3</u>	<u>10.6</u>	<u>13.7</u>	<u>15.0</u>	<u>16.8</u>	<u>19.4</u>	<u>18.4</u>	<u>14.2</u>	<u>14.5</u>
Total	100	100	100	100	100	100	100	100	100	100

IV. Wood allotted to pulp and paper industry and to other industrial uses, 1989–93

	<i>1989</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1993/1989,*</i> %
Volume of wood harvested for industry, 10 ⁶ m ³					
Pulp and paper industry	3.9	1.8	1.2	1.1	28.2
Other industries	<u>10.8</u>	<u>7.8</u>	<u>7.1</u>	<u>7.0</u>	64.8
Total	14.7	9.6	8.3	8.1	55.1
Volume of wood harvested for industry, %					
Pulp and paper industry	26.5	18.7	14.5	13.3	...
Other industries	<u>73.5</u>	<u>81.3</u>	<u>85.5</u>	<u>86.7</u>	...
Total	100	100	100	100	...

* Volume in 1993 compared with volume in 1989

the Romanian pulp and paper industry so that it emulates the world market. Some companies have already put these strategies into practice. Nevertheless, there are major obstacles to reorganization, notably the low utilization of available production capacities and a lack of investment capital. The lack of financial resources is a consequence of the excessive lag times between delivery of goods and payment to the manufacturer, high interest rates, and the low volume of exports. The low volume of exports, in turn, is a consequence of the recent cuts in production and the high cost of raw materials and energy.

On the positive side, the following points support the feasibility of reorganizing and modernizing the Romanian pulp and paper industry:

- Romania possesses an abundance of raw materials, which should facilitate a rapid return to efficient production of pulp and paper. The industry should be capable of fulfilling domestic requirements, with a surplus available for export, thus bringing in the necessary funds to import up-to-date equipment.
 - Romania possesses physical plants that can be modernized and improved to achieve efficient production.
 - Romania has an ample supply of skilled workers.
- The main objectives of the proposed reorganization are to

- Halt the recent trend of declining production
- Produce sufficient quantities of paper and board for domestic consumption
- Consolidate and modernize the most efficient production capacities
- Preserve existing production capacities that are currently idle
- Increase utilization of recycled fiber
- Reduce pollution through modernization
- Accelerate the pace of privatization
- Improve working conditions and compensation for workers.

Effects of reorganization

Modernization of pulp and paper mills will enable production of an increasingly diverse range of printing and writing papers, packaging and technical papers, and boards. The effects of reorganizing the existing production capacities are presented in Table VII.

If the Romanian pulp and paper industry is to be reorganized to resemble the world model, several important changes

V. Consumption of wood and recycled fiber in the pulp and paper industry, 1989–2000

	Actual			Predicted			
	1989	1993	1993/1989, ^a %	1994	1996	2000	2000/1989, ^b %
Wood consumption, 10 ⁶ m ³	3.9	1.1	27.6	1.25	1.53	2.3	59.0
Average wood consumption, m ³ /ton pulp	5.9	5.5	93.2	4.8	4.5	5.8	98.3
Recycled fiber consumption, 10 ³ tons	155.6	87.5	56.2	109.9	158.4	240.0	154.2
Average recycled fiber consumption, % ^c	22.0	30.3	137.7	34.0	39.0	40.0	181.8
Utilization ratio, % ^d	19.0	30.7	...	29.8	31.8	37.6	...

^a Consumption in 1993 compared with consumption in 1989
^b Consumption in 2000 compared with consumption in 1989
^c Weight percent of recycled fiber in paperboard
^d Weight percent of recycled fiber in pulp

VI. Energy consumption for pulp, paper, and board, 1989–2000

	Actual			Predicted			
	1989	1993	1993/1989, ^a %	1994	1996	2000	2000/1989, ^b %
Electricity							
Total, 10 ³ MW·h	1804.9	774.7	42.9	858.6	988.9	1100.9	61.0
Per ton of production, MW·h/ton	1.33	1.59	119.5	1.48	1.32	1.10	82.7
Fuels and thermal energy							
Total, 10 ³ tcc	1613.6	528.3	32.7	606.5	714.2	754.7	46.8
Per ton of production, tcc/ton	1.19	1.09	91.6	1.04	0.96	0.76	63.9

^a Consumption in 1993 compared with consumption in 1989
^b Consumption in 2000 compared with consumption in 1989

must take place. These modifications should be made with an eye toward increasing the competitiveness and profitability of the manufactured products. First, the manufacture of energy-intensive products—specifically, dissolving pulps—will have to be curtailed. It is also clear that the industry cannot continue manufacturing products with a high consumption of wood mass. The filler content of printing and writing papers will have to be increased, which will entail the use of a wide range of chemical additives. Production of packaging-paper grades will have to be diversified, with suitable mills specializing in production of particular grades. Specialization will promote efficiency and allow production of higher-quality paper while increasing the recycled-fiber content. The proposed evolution of pulp production through the year 2000 is compared with world production in Table III. Similarly, Table II shows the proposed mix of paper and board production.

Some general production lines should be specialized to produce high-quality boards, thus eliminating the need to import such products. Efforts are also underway to extend the competitive range of paper and board packaging materials. The product mix will consist of boxes of corrugated fiberboard, multi-ply corrugated board with one side of bleached

pulp, and coated folding boxboard for printing in several colors. The availability of such products will enable greater diversity in packaging, especially packages made of paper and board on one side and plastic on the other.

Table I shows the predicted evolution in pulp, paper, and board production through the year 2000. These levels of production will cover the needs of the internal domestic market. The predicted utilization of pulp-production capacity for 1996 is about 64%, while utilization of capacity for papers and boards should be about 80%. Corresponding figures for the year 2000 should increase to 75% and 90%, respectively. It is also expected that paper consumption per capita will reach 30 kg by the year 2000, compared with an annual consumption of 14 kg in 1993.

The reorganization plan for the Romanian pulp and paper industry also is shaped by the need to seek an optimum balance between import and export activities. The main objectives of this strategy are to:

- Reorganize production to meet the requirements of the export market
- Test new markets for newsprint exports

VII. Effects of reorganization on existing pulp and paper production capacity

	<i>Pulp</i>		<i>Paper and board</i>	
	<i>10³ tons</i>	<i>%</i>	<i>10³ tons</i>	<i>%</i>
Existing capacity				
Active	517	49.8	562	56.8
Standby	450	43.4	249	25.1
Terminated	<u>70</u>	<u>6.8</u>	<u>179</u>	<u>18.1</u>
Total	1037	100	990	100

- Consider importing pulp from local markets (Russian Federation and European Economic Community)
- Exchange products instead of currency (especially in the case of imported pulp for fabrication of specialty papers).

Raw materials and energy

The net volume of wood harvested for industrial use in Romania is expected to increase to 9.8 million m³ in 1994–95, a significant increase over the 8.1 million m³ harvested in 1993. The annual harvest is projected to increase to 11.5 million m³ sometime between 1996–2000. In the year 2000, the allocation to the pulp and paper industry is expected to be 20%, which translates to 2.3 million m³. This percentage compares favorably with the 26.5% reported in 1989 and is much higher than the 13.3% allocation in 1993. However, the net volume of harvested wood in 1989 was an unsustainable 14.7 million m³, significantly higher than the 11.5 million m³ projected for the year 2000.

Pulp production ideally requires a mix of 70% softwood and 30% hardwood. Unfortunately, Romania's wood supply consists of only 37% softwood. The bulk of the wood supply consists of fast-growing plantations of hardwood. Consequently, Romania will have to produce pulp using a mix of 50% hardwood and 50% softwood for the foreseeable future, which will put a strain on the pulp industry. Given the relative scarcity of the softwood resource, the pulp and paper industry is urging studies to examine the feasibility of increasing hardwood utilization in other sectors of the forest-products industry. At the same time, the industry hopes to compensate for some of this shortfall by exporting larger amounts of hardwood pulp.

The planned reorganization and modernization is expected to lead to an overall decrease in wood consumption for the main pulp grades and a drop in pulp consumption per ton of paper through the year 2000, when they are expected to be in line with world levels. Table VIII shows the current and projected consumption of wood and pulp through the year 2000.

Consumption of recycled fiber is expected to increase between 1993 and 2000. This will require an increase in paper production and the development of a system to presort post-consumer waste during the collection phase, followed by a final sorting based on classes of quality. It is estimated that the requirements of recycled fiber over the period of 1998–2000 will be completed by importing about 40–50 thousand tons/year.

Modernization of the newsprint machine at the SC Letea SA Bacau mill will increase its production capacity by 20,000 tons/year. Newsprint quality also will be improved by substituting about 40% mechanical pulp with deinked recycled fiber. The modernization of the newsprint machine will also reduce wood consumption per ton of paper to world levels by the year 2000, as seen in Table IX.

Energy consumption also will be progressively reduced, reaching typical world levels by the year 2000, as seen in Table X. The chemicals used in pulp mills will be 95% of Romanian origin.

Environmental issues

The reorganization and modernization program involves a series of measures that are aimed at reducing pollution to levels permitted in the industrialized countries.

The pulp and paper industry has a considerable effect on the environment, mainly the result of

- Airborne emissions from pulp manufacture
- Release of suspended and dissolved organic compounds in effluent
- Landfilling of sludge from effluent treatment.

Table XI shows the expected declines in pollution through the year 2000.

Retooling the work force

Between 1989 and 1993, the number of employers decreased by about 20%. Meanwhile the production of pulp, paper, and board in 1993 was only 35.8% of production in 1989 (Table I). Consequently, work efficiency in 1993 was only 48.1% of that recorded in 1989.

While production has declined significantly since 1989, cutbacks in staff have been relatively small. This can be explained in part by the need to maintain the same number of jobs for the permanent control and supervision of the installation, regardless of the production obtained. Another factor is the difficulty in transferring the unique skills of pulp and paper workers to other industries. This problem has been compounded by the absence of programs to retrain workers for jobs in other industries. Table XII shows the predicted utilization of worker hours through the year 2000. As seen in Table XII, the number of workers will be reduced by 31% by the year 2000, compared with 1989. Meanwhile, the production's value will double, compared with 1993. Some of the dismissed staff will probably

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VIII. Wood and pulp consumption, 1993–2000

	1993	1994	1995	1996	2000
Wood consumption, m ³ /ton					
Kraft pulp	6.8	6.7	6.4	6.1	5.2
Sulfite pulp	6.2	6.2	6.0	5.8	5.2
Pulp consumption, kg/ton					
Newsprint	320	320	250	200	200
Printing & writing papers	930	920	880	850	830

IX. Wood consumption for newsprint, 1992–2000

	World level	1992	1994	1996	2000
Wood consumption, m ³ /ton	2.5	4.5	4.3	3.1	2.5

X. Energy consumption in various sectors of pulp and paper industry, 1993–2000

Group of products	World level	1993	1994	1995	1996	2000
Pulp						
Electrical energy, MW·h/ton	0.61	0.72	0.70	0.68	0.65	0.63
Thermal energy, tcc/ton	0.50	1.10	1.05	1.00	0.90	0.70
Paper and board (excluding newsprint)						
Electrical energy, MW·h/ton	0.73	0.86	0.82	0.80	0.76	0.71
Thermal energy, tcc/ton	0.30	0.45	0.44	0.43	0.41	0.38
Newsprint						
Electrical energy, MW·h/ton	1.35	1.80	1.70	1.60	1.30	1.35
Thermal energy, tcc/ton	0.25	0.50	0.46	0.42	0.27	0.25
Corrugated board						
Electrical energy, MW·h/ton	0.027	0.032	0.032	0.031	0.030	0.028
Thermal energy, tcc/ton	0.70	1.60	1.50	1.40	1.00	0.80

be trained for other professions on the same industrial platform.

Strategies of privatization

Privatization appears to be the only way to resurrect the Romanian pulp and paper industry. The program of privatization should consider the following factors:

- The considerable investment that will be required to modernize and reorganize the industry
- The lack of financial resources within Romania
- The existence of large, inflexible, integrated production capacities with obsolete physical assets and workers who will require training to operate new equipment
- The reduced external market for pulp and paper
- The low rate of return from both Romanian and foreign investments
- The high cost of physical plant.

Despite these obstacles, it is estimated that most of the existing companies could be privatized by 1996. If that is to occur, the following items will have to be addressed in the near future.

- Identify production capacities that are capable of functioning independently.
- Identify Romanian investors.
- Reorganize the existing production capacities to specialize in production of appropriate groups of products.
- Lobby for financial support from the Fund of the State Property to modernize pulp production at two mills (Somes Dej and Celhart-Donaris Braila). This would be a prerequisite for privatization of 11 other companies in the same field.

XI. Pollutants from pulp and paper industry, 1989–2000

	1989	1993	1994	1996	2000	2000/1989,* %
Liquid effluent						
Oxygen-consuming organic compounds, 10 ³ tons/year	190	56	69	48.5	13	6.8
Total suspended solids, 10 ³ tons/year	46.8	22	22	17.6	8.5	18.2
Chlorinated organic compounds, tons/year	1350	316	384	481	314	23.2
Airborne emissions						
Sulfur dioxide, 10 ³ tons/year	18.4	4.2	5.8	6.8	3.6	19.6
Powders, 10 ³ tons/year	25.9	8.4	8.1	11.2	6	23.1
Mercaptans, tons/year	1200	576	620	600	300	25.0
Hydrogen sulfide, tons/year	700	254	265	317	216	30.8
* Predicted loading in the year 2000 compared with loading in 1989						

XII. Availability and utilization of worker hours, 1989–2000

	1994/1993, ^a %	1996/1993, ^b %	2000/1993, ^c %	2000/1989, ^d %
Volume of industrial production				
in comparable costs	112.7	130.8	184.6	83.9
Workers	96.7	90.0	83.3	68.5
Work efficiency	113.0	164.3	250.7	121.9
^a Predicted level in 1994 compared with 1993				
^b Predicted level in 1996 compared with 1993				
^c Predicted level in the year 2000 compared with 1993				
^d Predicted level in the year 2000 compared with 1989				

Overview

The Romanian pulp and paper industry has suffered a continuous decline in production since 1989. This decline has been halted, and production is expected to increase steadily through the year 2000. A detailed strategy for reorganizing and modernizing the industry has been developed through the cooperative efforts of several research institutes. The ultimate objective of this plan is to create joint-venture-type mixed societies, supported by foreign and Romanian investors. In the meantime, the process of privatization is underway. However, the firm support and encouragement of the Romanian government would accelerate the rate of change.

Romania's industrial expansion in past decades was a mirror of the nation's efforts to train pulp and paper scientists. The creation of the Department of Pulp and Paper Technology at the Technical University of Jassy in 1948 was an important factor in moving the industry forward. Another was the attention devoted to scientific research. Romania became a focal point for specialists around the globe when it became the first

Eastern European country to organize an international scientific conference. The first International Symposium on Cellulose Chemistry and Technology was held in 1961. The symposium was a success, and it has become a tradition, with nine additional symposia organized since that time.

During the second symposium in 1965, several pulp and paper scientists suggested that a specialized international journal should be published in Jassy. Subsequently, the journal *Cellulose Chemistry and Technology*—under the guidance of an international editorial board—came into existence in 1967 and has been published without interruption since that time. This journal supplemented the information provided by an older Romanian journal, *Celuloza si Hirtie (Pulp and Paper)*, which has been published since 1951. Along the years, *Cellulose Chemistry and Technology* has come to represent a bridge between East and West, serving as an information “oasis,” especially in the terrible last years of the “communist desert,” when hardly any scientific information was available to Romanian specialists.

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After so many years of deprivation and hardship, we hope that Romanian industry is on the verge of prosperity. Unfortunately, it seems that the old "iron curtain" is being replaced by another curtain that is even more difficult to penetrate. The acute lack of financial resources in Romania is a formidable obstacle to modernization and impedes access to information. The lack of funds for scientists to participate in international meetings remains a big problem.

On the other hand, the Romanian government has expressed its intention to make education and research top priorities, which will undoubtedly advance the progress of science in this corner of the world. Given these hopeful signs, we firmly believe that the international community of science will support the scientists who remain isolated in Romania. To this end, we are urging development of joint programs of scientific cooperation with interested countries, so that travel and board expenses can be minimized.

The overall conclusion of this detailed evaluation of the Romanian pulp and paper industry is that neither industry nor education nor research can be suitably developed without the help of the international community. The industry can be rebuilt, but it will require a free exchange of ideas, information, investment capital, and research scientists. 

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