ETLA ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY Sarja B 198 Series

Sergey Boltramovich, Grigory Dudarev,
and Vladimir Gorelov

THE MELTING IRON CURTAIN

A Competitive Analysis of the

Northwest Russian Metal Cluster

ETLA, The Research Institute of the Finnish Economy

Publisher: Taloustieto Oy

Helsinki 2003

Cover: Mainos MayDay, Vantaa 2003

ISBN 951-628-383-7
ISSN 0356-7443

Printed in: Tummavuoren Kirjapaino Oy, Vantaa 2003

BOLTRAMOVICH, Sergey – **DUDAREV**, Grigory – **GORELOV**, Vladimir, **THE MELTING IRON CURTAIN. A Competitive Analysis of the Northwest Russian Metal Cluster.** Helsinki: ETLA, The Research Institute of the Finnish Economy, 2003, 140 p. (B, ISSN 0356-7443; No. 198). ISBN 951-628-383-7.

ABSTRACT: This book presents the Northwest Russian metal industries and the most important companies, and examines their competitiveness and future prospects. Metal industry plays an important role in Northwest Russia. Its share in the industrial output is over 20%. The transition from the socialistic economy to the market economy, and privatization have reshaped the industries. In the Soviet period metal industry produced raw material for domestic munitions, machine building and construction. After the collapse of the domestic demand, metal companies were forced to, and managed to enter the export markets. The book analyzes competitiveness employing the so-called cluster analysis approach. Relatively cheap and abundant raw materials, energy, transportation and labor force are the main components of the cost competitiveness of companies. Production technologies are, however, outdated. Productivity is low and production consists of products with low value added. In principle, the Northwest Russian metal cluster has all the necessary elements needed for a competitive metal cluster. Yet, improving competitiveness requires substantial investments, which would also help to solve environmental problems.

Key words: Northwest Russia, metal industry, industrial clusters, competitive advantage, economic growth, industrial policy.

BOLTRAMOVICH, Sergey – **DUDAREV**, Grigory – **GORELOV**, Vladimir, **THE MELTING IRON CURTAIN. A Competitive Analysis of the Northwest Russian Metal Cluster.** Helsinki: ETLA, The Research Institute of the Finnish Economy, 2003, 140 s. (B, ISSN 0356-7443; No. 198). ISBN 951-628-383-7.

TIIVISTELMÄ: Kirjassa esitellään Luoteis-Venäjän metallinjalostuksen eri toimialat ja merkittävimmät yritykset sekä tutkitaan niiden kilpailukykyä ja tulevaisuudennäkymiä. Metallinjalostus on erittäin merkittävässä asemassa Luoteis-Venäjällä. Sen osuus teollisuustuotannosta on yli 20 prosenttia. Siirtyminen sosialistisesta taloudesta markkinatalouteen ja yksityistäminen muovasivat voimakkaasti teollisuutta. Neuvostoaikana pääasiakkaita olivat kotimainen sotatarviketuotanto, koneenrakennus ja rakentaminen. Kun kotimainen kysyntä romahti, metallinjalostajat pelastuivat tunkeutumalla vientimarkkinoille. Kirjassa tutkitaan kilpailukykyä ns. klusterianalyysin avulla. Suhteellisen edulliset, runsaasti saatavilla olevat raaka-aineet, energia ja kuljetukset sekä työvoima antavat yrityksille kustannuskilpailukykyä. Tuotantoteknologia on kuitenkin vanhentunutta, tuottavuus huono ja tuotteet jalostusasteeltaan alhaisia. Periaatteessa Luoteis-Venäjällä on olemassa riittävä perusta kilpailukykyisen metallienjalostusklusterin muodostumiseksi. Kilpailukyvyn parantamiseksi tarvitaan kuitenkin merkittäviä investointeja, joilla myös ympäristöongelmia saataisiin pienennettyä.

Avainsanat: Luoteis-Venäjä, metallinjalostus, klusterit, kilpailuetu, taloudellinen kasvu, elinkeinopolitiikka.

Preface

The metal industry has become very valuable to Russia, thanks to strong world demand for its inexpensive products. In fact, the whole metal industry has undergone dramatic changes. It used to be a supporting industry of munitions manufacturing and machine building. Now the branch has become an independent export-oriented industry. The metal industry, alongside the steel industry, also produces aluminum and non-ferrous metals.

Russia's substantial raw material supplies, on an international comparison, give the metal industry an important competitive advantage. Another advantage is relatively cheap energy. Unit labor costs in the industry are also low compared with international competitors. Low productivity, however, weakens this advantage. Compared to western standards, the industrial process requires too many workers.

Experience has shown that when profits come too easily, innovativeness and even efficiency can suffer. When operating conditions change sharply, for example when the price of energy rises considerably or ore mining costs increase, the metal industry can lose some of its competitiveness. This is the golden age of the Russian metal industry. It can make profit and could invest. Greater investment would also help foster improvements in environmental issues.

Domestic demand for metals will strengthen once Russian industrial production recovers and construction activity expands. As a matter of fact, much more than that is needed – flexible suppliers, new business concepts, developed downstream operators, and products that Russia does not produce. From the viewpoint of the Russian economy, it would be advantageous to remove unnecessary import barriers and ease the establishment of foreign companies in Russia. WTO membership would be an important step towards freer competition. Foreign competitors would force the Russian metal companies to develop.

February 2003

Pentti Vartia

Authors' Preface

This study is devoted to the analysis of competitiveness and prospects for development of the metallurgy and metal-working cluster of Northwest Russia. This cluster, being one of the basic industries of the country's economy, has experienced radical changes over the last decade, including the major characteristics of the markets, forms of ownership, structure and volume of output, the nature of state regulation, etc. These transformations require a new look at the present situation in the cluster, as well as the advancement of new approaches to evaluating its potential for further development. The authors do not claim to have provided an exhaustive review of all current issues in all their aspects. This paper is perhaps the initial stage of such a review, aimed at provoking further discussion of many pressing problems with the participation of the many parties concerned. We hope that from this angle the study will attract the attention of many interested readers from various walks of life.

The research was carried out by a consortium of participants, including: *The Centre for Strategic Research*, a leading Russian think tank; *ETLA* – The Research Institute for the Finnish Economy, a leading Finnish economic research institute; and *Solid Invest*, a St. Petersburg research-based consulting company specializing in economic analysis and strategy development.

The authors are very grateful for support from the Association of Finnish Steel and Metal Producers, the Finnish Ministry of Trade and Industry and the leading Finnish metal cluster companies: AvestaPolarit Oyj Abp, Imatra Steel Oy Ab, Metso Minerals Oy, Outokumpu Oyj, Kuusakoski Oy and Rautaruukki Oyj.

We are indebted to *Mr Hannu Hernesniemi* (Research Director, Etlatieto Oy), who provided the research with huge amount of organizational work and backing. This study will would have never been possible without his creative, skilful and active support and advice.

We would like herewith to express our gratitude to the Steering Group members and other experts from the companies and organisation financing the study: Ms Sirpa Smolsky, Managing Director, Association of Finnish Steel and Metal Producers; Mr Harri Vehviläinen, Manager, Raw Materials Purchasing, AvestaPolarit Oyj Apb; Mr Lasse Vihavainen, Business Planning Manager, Imatra Steel Oy Ab; Mr Ilpo Auranen, Business Development Vice President, Mr Henry Holm, Product Manager, Metso Minerals Oy; Mr Lauri Pullola, Senior Adviser, Finnish Min-

istry of Trade and Industry; Mr Pekka Hynynen, Vice President, Business Development, Outokumpu Oyj; Mr Aki Ojanen, Chief Operating Officer, Kuusakoski Oy, and Mr Lauri Pohjanvirta, Vice President, East Trade, Rautaruukki Oyj.

The authors would like also to express their acknowledgement to members of our research team, which contributed a lot to this study: Mr Pavel Filippov, Mr Alexey Deriabin, Mr Dmitry Belov, Mr Stanislav Redman, Mr Andrey Averin, Mr Anton Savchenko, Ms Veronika Voinovian, Ms Anna Ignatieva, Ms Melina Laakso, Ms Daria Kozeichuk, Mr Sergey Afonin.

Helsinki, January 2003

Contents

Summary
Yhteenveto

1	Introduction	1
2	Theoretical Framework	3
2.1	Introduction	3
2.2	Concept of the Cluster	5
3	Identification of the Metal Cluster of North-west Russia	10
3.1	Brief History of the Cluster	10
3.2	Ore Resources in Northwest Russia	14
3.3	Cluster Structure	19
3.4	Role of the Cluster in the Economy of Russia and Northwest Russia	23
3.5	Current Cluster Development Macro-trends in the World	27
4	International Trade and Position in the World Market	30
5	Sub-sectors of Metallurgy and Metal Working in Northwest Russia	40
5.1	Cluster Sub-sectors and Their Agglomerations	40
5.2	Ferrous Metallurgy and Metal-working	42
5.3	Non-ferrous Metallurgy and Metal-working	47
5.4	Metallurgy Equipment Manufacture	54
5.5	Related Industries and Services	57
5.6	Education and R&D	62
6	Factors of Competitiveness and Development Trends	67
6.1	Factor Conditions	69
6.2	Demand Conditions	73
6.3	Company Strategy, Structure and Competition	77
6.4	Related and Supporting Industries	84
6.5	Government	88
7	Conclusions	91

Appendices

A1.	Structural Changes in the Russian Domestic Metal Product Market	99
A2.	Technology Investment Patterns of Russian Mining and Metal Companies	109
A3.	Secondary Metals and Scrap Recycling: Effective Strategies for Development	119
A4.	Logistics: Assessment of Bottlenecks	129
References		137

Figures

Figure 2.1	"Diamond" Model	3
Figure 2.2	Cluster Structure	6
Figure 3.1	Exploited Iron Ore Deposits in Northwest Russia	14
Figure 3.2	Exploited Non-ferrous Ores Deposits in North-west Russia	16
Figure 3.3	Northwest Russian Metal Cluster Chart	19
Figure 3.4	Flow Chart of the Metallurgy and Metal-working Cluster of Northwest Russia	22
Figure 3.5	Largest Metallurgy Agglomerations in Russia	24
Figure 3.6	Regional Structure of Russian Metallurgy in 2000 by Federal District	25
Figure 3.7	Structure of Industrial Production in Northwest Russia in 2000	25
Figure 4.1	Russian Exports Structure in 2000	30
Figure 4.2	Russian Imports Structure in 2000	32
Figure 5.1	Northwest Russia Metallurgy and Metal-working Agglomerations	40
Figure 5.2	Ferrous Metallurgy and Metal Working in the Northwest Region, 2001	42
Figure 5.3	Structure of the Non-ferrous Metallurgy and Metal-working in Northwest Russia	47
Figure 5.4	Energy System in Northwest Russia	57
Figure 5.5	Educational and R&D Infrastructure and its Primary Funding Principles	64
Figure 6.1	Factors of Competitiveness of Northwest Russian Metal Cluster	67
Figure 6.2	Annual Consumption of Steel Products in Russia, Million Tons	74
Figure 6.3	Russian Exports of Rolled Ferrous Metal Products, by Country, %	75

Figure 6.4 Structure of Ownership in Northwest Russia: Ferrous Metallurgy and Metal-working 79
Figure 6.5 Structure of Ownership in Northwest Russia: Non-ferrous Metallurgy and Metal-working 80
Figure 6.6 Dynamics of Employment in Metallurgy Industry in the World, Thousand People 82
Figure 6.7 Average Hourly Wages in Metallurgy Industry, USD 83

Figure A1.1 Utilization Rate of Production Facilities in 2001, % 104
Figure A1.2 Consumption of Aluminum by Industry, % 106
Figure A2.1 Aggregate Investment in Russian Economy, % of Total Volume 109
Figure A3.1 Share of Steel Produced from Scrap Metal, % of Total Output of Steel 120
Figure A3.2 Scrap Metal Resources by Origin, % 122
Figure A4.1 Map of Main Transport Routes in Northwest Russia 129
Figure A4.2 Freight Turnover of St. Petersburg Seaport in 2002 by Type of Freight, % 133

Tables

Table 3.1 Ferrous Metallurgy Output in Northwest Russia in 1990-2000, Thousand Tons 13
Table 3.2 Russian Metallurgy in 2000 24
Table 3.3 Northwest Russian Metallurgy by Regions 26
Table 4.1 Share of Exports in Sales of Metallurgy Companies in Northwest Russia, 2001 31
Table 4.2 Consumption Balance of Rolled Steel in Russia, Thousand Tons 31
Table 4.3 Competitiveness of Russian Metal Products on OECD Markets 35
Table 4.4 Largest Metal Product Markets and the Share of Russian Companies, HS, 4-Digit Level 36
Table 4.5 Potential of Import Substitution in Russia 37
Table 4.6 Prospects for Import Substitution, HS, 6-Digit Level 38
Table 5.1 The Largest Ferrous Metallurgy and Metal-working Companies in Northwest Russia 43
Table 5.2 The Largest Non-ferrous Metallurgy and Metal-working Companies in Northwest Russia 48
Table 5.3 The Largest Metallurgy Equipment Manufacturers in Northwest Russia 54
Table 5.4 Emissions by Enterprises of the Metallurgy and Metal-working Cluster in Northwest Russia in 2000 61

Table 5.5	Key Northwest Russian Institutes for the Metallurgy and Metal-working Cluster	62
Table 6.1	Utilization of Russian Ferrous Metallurgy Production Facilities, %	71
Table 6.2	The Share of Wages and Salaries in the Cost Structure of the Metallurgy Companies in 2001, %	71
Table 6.3	Consumption of Non-ferrous Metals in 1998, Thousand Tons	74
Table 6.4	Productivity of the Metallurgy Companies	83
Table 6.5	Electric Power Tariffs for Industrial Consumers on Average, US cent/kWh	85
Table A1.1	Output of Basic Ferrous Metal Products in Northwest Russia, Thousand Tons	100
Table A1.2	Major Consumers of Ferrous Metallurgy Products in Russia in 2001, Million Tons	102
Table A2.1	Output of Electric Steel and Basic Oxygen Steel in Total Output of Steel, %	110
Table A2.2	Output of Steel Produced by Continuous Casting Technology in Total Output of Steel, %	110

Boxes

Box 2.1	Theoretical Routes	7
Box 3.1	Severstal – Planning and Construction of the Largest Enterprise in Northwest Russia	11
Box 3.2	Timan Bauxite – the Biggest Non-ferrous Ore Deposit Development Project in Northwest Russia	17
Box 4.1	Methodology for the Foreign Trade Analysis	32
Box 4.2	Large-diameter Pipes Production in Russia: To Be Or Not To Be?	39
Box 5.1	Problems of Introducing IT at Metallurgy Enterprises	59
Box 5.2	All-Russian Aluminum-and-Magnesium Institute	65
Box 6.1	ISO Certification of Russian Metallurgy Companies	76
Box 6.2	Russia's 'Wild West': Peculiarities of New Ownership in the Transition Period	78
Box 6.3	'Aluminum Fever' in Northwest Russia	81
Box A3.1	European Response to the Deficit of Ferrous Scrap	124
Box A3.2	Licensing of Recycling Operations in Ukraine	127
Box A4.1	Construction of New Railways	132

Summary

This paper analyses competitiveness of the Northwest Russian metal cluster in the new economic environment created during the period of liberal reforms. The metal cluster includes metallurgy, metal working and related activities such as mining, technology and equipment manufacturing, transport and logistics, education and R&D services. Northwest Russia is one of the seven, newly created Federal Districts in Russia. It borders on the West with the Baltic countries, Finland and Norway and in the East it is limited by the Urals. There are roughly 15 million inhabitants in the region. Its administrative center is the City of St. Petersburg.

Northwest Russia is a relatively rich area in iron and other metals ore deposits. Substantial ferrous and non-ferrous metal production and processing industries were created here on basis of these raw materials. In the Soviet period the metals production was developed as a supporting activity for the military products manufacturing, heavy machine building and construction that were considered to be strategically important industries. After the Soviet Union dissolved in 1991 the above mentioned customer groups have rapidly lost their importance and have entered into the phase of long and severe decline. The metal producers survived by re-orienting to export markets. At present these industries in Russia have grown into an important and independent area of economic activity that could become also internationally significant under certain scenarios.

The goal of this study is to present information and an analysis of the Northwest Russian metal extraction and production as well as of their supporting industries. In addition, we assess the current competitiveness and development prospects for the Northwest Russia metallurgy and metalworking cluster. For the purpose of analysis we apply the cluster analysis and "diamond" model of competitiveness developed by Michael E. Porter.

This cluster was mainly formed during the Soviet period. It was developed on the basis of the ferrous and non-ferrous metals ore deposits proven at the time. One of the most important years for the Northwest Russian production of ferrous metals was the year 1958 when the first steel was produced by the largest metal producer in the region – Severstal located in the City of Cherepovets of the Vologda region. The key milestone for the non-ferrous metals production was the year of 1932 when the Volkhov Aluminum Plant in the Leningrad region started its

operation. Another important impulse the non-ferrous metals production in Northwest Russia received when after the Second World War the production of nickel and related metals was started based on the deposits in the annexed area of Pechenga in the Murmansk region.

Development of the cluster was facilitated by presence in the region of major consumers of metals, i.e. of the large machine building enterprises located in Leningrad (now St. Petersburg) and in other large cities of the Northwest. It is notable that Severstal, one of the major metallurgy enterprises in Russia, was built in the proximity of its main consumers, and at a rather long distance from deposits located beyond the Polar circle. The cluster structure was formed in the conditions of closed self-sufficient socialist central planning economy, and is presently in a continuous process of restructuring and adaptation to the new economic environment, i.e. to the open market economy.

The metal cluster is the leader in production volumes among all industries of Northwest Russia, and accounts for high shares of regional output of many of its regions. From the industrial production of the Vologda region it represents the substantial 70% of the total, in Murmansk region nearly half of the total and almost 20% in the Republic of Karelia. Since during the last decade over a half of the cluster output has been exported, it is now a significant player in the international markets and gets more and more dependent on the global market trends.

The analysis of Russian import and export of metal products carried out on the basis of trade statistics of OECD countries allows the conclusion that the largest export market share belongs to Russian unwrought metals, intermediary products and scrap metal. It is thanks to these categories of products that Russia now has a strongly positive trade balance. At the same time, a large amount of higher added value products is imported. These are the tubes and pipes, structures and parts of structures of steel or aluminum, shapes, foil etc. This fact definitely points to a certain opportunities to develop the import substituting activities. This in its turn requires substantial investments in upgrading or building the new facilities. At the same time, it would be necessary to start developing competitive advantages of the most optimal locations. There is a need for investment in new facilities or significant upgrading of the existing ones, and for investment in competitive infrastructure, transport and logistics, energy supplies, and qualified labor force. One can find only a few locations in Northwest Russia that meet the criteria for an optimal location. The role of the government as facilitator and provider of the infrastructure is very important. In our analysis one can find many suggestions related to industrial policy, which would make the measures taken by the government more efficient.

Among the good examples of the current opportunities and problems of import substitution one can point to the investment in the manufacturing of the large size pipes. There are no suitable facilities in Northwest to fit for production of large-diameter pipes for mainstream pipelines. Therefore meeting growing domestic demand requires construction of new facilities and therefore substantial investments. In addition to the competitive infrastructure and operating environment investors are willing to secure the market share for their products. As result they are looking for having competitive edge not only on the domestic but also on the global markets. Substantial costs and vulnerability of export infrastructure (transport, custom clearance, etc.) the hesitant and volatile purchasing policy of the main consumers for such pipeline manufacturing that are the state-controlled Gazprom and Transneft these projects are not developed and the pipes are imported from the Ukraine and other countries. Nevertheless there are currently are several investment projects under development in Northwest Russia that are aimed to meet the growing local demand for the higher value added metal products.

The cluster of metallurgy and metalworking in Northwest Russian is characterized by its distinct territorial differentiation. The Kola-and-Karelia agglomeration specializes in extraction and enrichment of ores and in metallurgy of primary non-ferrous metals. The Northwestern agglomeration is characterized by a rather wider range of products, but is based in primary ferrous metallurgy (Severstal), with several enterprises also specializing in primary non-ferrous metallurgy, as well as secondary metallurgy and ferrous and non-ferrous metal-working (the latter are concentrated in St. Petersburg). There are also prospects for development of new non-ferrous metals agglomeration in Republic of Komi based on the major bauxite deposits, development of which has been started in the region in 1997. It is anticipated that, in the future, development of certain areas in these agglomerations will lead to further concentration of activities in the areas with better infrastructure and market opportunities. More service and technology suppliers will emerge in such locations, as they would offer better market opportunities and increasing returns to scale. Thus development of the higher value added activities could be more active in the areas close to the cities of St. Petersburg and Cherepovets, and, probably, Syktyvkar.

Our analysis demonstrates that the Northwest Russia metallurgy and metalworking cluster is still quite fragmented and underdeveloped. The important areas to improve in order to advance the future competitiveness of the cluster are the suppliers and their networks, infrastructure, energy production, logistics and other related activities. In the Soviet period large industrial conglomerates that comprised a wide range of core

and related activities were created. Under conditions of the market economy and private ownership such concentration of various activities in the same company became a heavy burden that undermined competitiveness of the companies substantially. Today specialization and necessity to gain cost advantages by outsourcing non-core activities, concentrating on the main business are the major anticipated needs. Although the need is well realized, changes in this direction will be quite slow. They require large investments, efforts by the regional governments, commitment and high readiness of all the counterparts involved. For many metallurgy and metalworking companies their remote locations, fragmented and uneven development of the necessary infrastructure and poor availability of suppliers are the great obstacles for development and will lead to substantial structural changes in the cluster in the future. The companies located close or inside the larger agglomerations such as the City of St. Petersburg or Cherepovets will benefit from the scale effects of regional concentration and develop better then others.

Other important constituent parts of the cluster are enterprises producing specialized equipment, specialized educational and R&D institutions. Decline in the industry overall had a damaging effect on these activities. Over the last decade these producers and service providers have been experiencing serious problems because of low competitiveness of their offerings, i.e. their high dependency on the old, Soviet period solutions. As a result there was necessity to invest in upgrading and adjustments. That was not always possible owing to the overall situation in the country. Destruction of the previously strong links between education, research and production, scarce financing, and the resulting deterioration of capital assets, loss of qualified personnel, etc. has a substantial adverse effect on the competitiveness. There are also encouraging news that the fittest survived and cooperation between R&D, education and the companies do improve.

As the transport and energy sectors in Russia are still under the state control there is a major role that government could play in improving the competitiveness of the domestic producers by steering in thoughtful and coordinated way the reforms of these sectors. The changes that are about to come with the freeing of the energy markets and privatization of the railroad transport could have a major impact on the companies costs and shall be coordinated in order to provide for a smoother transition to the market-based prices.

The authors of this study demonstrated that the main production factors inherited by the metal cluster from the Soviet period (raw materials base, production facilities, infrastructure, educational and R&D potential) have been heavily exploited during the last decade, but that there

were obviously insufficient investments in their development, which has now led to substantial depletion of possibilities derived from these factors. There is a clear need for substantial investments in the cluster. Improving economic and political situation in the country creates a good basis for attracting more outside investors in this activity. Also the more successful companies such as Severstal generate sufficient own cash flows to invest in modernization. It invests on a regular basis in upgrading and extending of its product offering.

Basic redistribution of ownership in the Northwest Russian metal cluster has evidently been completed, and the companies are now paying much more attention to the issues of development. At the same time, there are certain apparent negative features, such as exceptionally low degree of transparency of business processes, excessive number of unqualified personnel, heavy social costs, and substantial contamination of the environment. It is expected that growing need to attract outside investors will force companies to adjust these practices and improve their business reporting. One can envisage that the Russian stock market could become the major source of investments for the companies of the cluster in the near future. This as well as the need to legalize their earnings will motivate owners to open books and be more transparent to the outside world.

There is yet another set of factors that shaped the current output structure of the Northwest Russian metallurgy and metalworking. These are the currently low labor (approx. 1 USD per hour) and energy costs (several times lower than in Europe and many other countries, i.e. 1.4 US cents per kWh in Russia), possibility to save on the environment protection measures, etc. It is anticipated that on-going energy sector reform, increasing requirements for the quality of labor and growing pressure to pay higher salaries will drive these costs upwards in the near to medium term. This will motivate companies to invest in modern, more efficient technologies and solutions. There is a room for improvement as the labor productivity in Russia is among the lowest in the world (turnover per employee does not exceed 50 000 USD whereas in developed countries it varies from 150 000 to 400 000 USD). Therefore such changes are urgently needed to bring better technologies and reduce pollution that is still very high. Commitment and support of the government bodies in these areas will be of crucial importance for the development of business in this sector. It is evident that existing may be substantially strengthened or weakened depending on the government actions and policy.

The domestic demand is essential for the growth of competitive producers. Today it is only taking off after the sharp decline associated with the transition to the market economy. There is a steady growth registered

already for the number of years. The demand for steel in 2001 exceeded already 20 mln tons. Consumption of the steel and, especially of the non-ferrous metals per capita is very low in Russia (10–30 % below the western level). It is expected to grow as the domestic processing industries gain strength and the purchasing power of the population increases.

Domestic demand for the products of the cluster fell dramatically with the introduction of liberal economic reforms, and in order to survive the companies of the industry had to export most part of their output. However, only Russian products with low added value are competitive in the world market, which led to substantial deterioration of product structure of the cluster. Besides, Russian products are gradually forced out from the markets of developed countries, and this trend will possibly continue in the short to medium term. Another important trend of shifting labor and energy intensive manufacturing away from developed countries associated with growth of domestic demand for the higher quality products will, in medium term, most probably offset and reverse effects of this trend on domestic producers. Today the major markets for the Russian metals are located in the developing countries. Anticipated future growth of these markets that could substantially outpace the growth in developed world will add substantially to the opportunities of the Russian producers as they acquired a good knowledge and positions in many of the important markets.

Another possible source for improving efficiency and gaining advantages in Russia will be achieving higher rate of collection of scrap and domestic processing of the secondary raw materials. So far these are among the most criminalized areas of activities in Russia. Lack of efficient infrastructure, rules and regulations leads to various damages to operating equipment as some are trying to dismantle and sell even the most important items. On the other hand lack and difficulties in operating the collection and processing motivate the unrecorded activity as it is closely to impossible to efficiently comply to all the numerous and contradicting rules and regulations. The domestic manufacturing on the other hand will benefit substantially from the efficient and transparent scrap collection and processing.

Development of competitive capabilities of the metallurgy and metal working cluster in Northwest Russia require substantial improvements in national, regional and industry's investment climate in order to provide major growth of financial inputs in the cluster. Besides, it is crucial to have the larger domestic market (mainly machine building and construction), which is perhaps the only way to provide for a better product structure involving a larger proportion of products with high added value.

As we have seen from the analysis of the case companies in the cluster notwithstanding the difficulties of the transition and associated changes in market demand many companies were able to adjust. Today they are in the process of the gradual improvement of the operations after reforms. There is process of concentration that led to creation of the powerful private conglomerates in this business. We believe that the further logical step will be to invest in more efficient and up-to-date technologies and processes. The regional and federal governments could do a great job by easing and facilitating this improvement by providing coordinated efforts, a better infrastructure and operating environment for the industry.

Yhteenveto

Tutkimuksessa analysoidaan Luoteis-Venäjän metalliklusterin kilpailukyvyn kehitystä liberaalien talousuudistusten luomassa ympäristössä. Metalliklusteri koostuu metallurgiasta ja metallinjalostuksesta sekä niitä palvelevasta kaivostoiminnasta, teknologiavalmistuksesta, kuljetuksista ja logistiikasta sekä erilaisista muista palveluista kuten koulutus- ja tutkimuspalveluista. Luoteis-Venäjä on yksi Venäjän äskettäin muodostetuista seitsemästä suurpiiristä. Lännessä se rajoittuu Baltian maihin, Suomeen ja Norjaan sekä idässä Ural-vuoristoon. Alueella asuu noin 15 miljoonaa ihmistä ja sen hallinnollinen keskus on Pietari.

Luoteis-Venäjällä on suhteellisen runsaasti rauta- ja muita metalliesiintymiä, ja siksi alueelle on syntynyt merkittävää rauta-, värimetalli- ja alumiiniteollisuutta. Neuvostoaikana metallinjalostus oli sotatarviketuotannon, raskaan koneenrakennuksen sekä rakentamisen aputoimiala. Neuvostoliiton hajottua 1991 nämä asiakasalat menettivät nopeasti merkityksensä ajautuen pitkään ja vaikeaan lamaan. Metallintuottajat pelastuivat suuntautumalla vientiin. Nyt metallien jalostuksesta on kehittynyt tärkeä ja itsenäinen osa Venäjän taloutta, josta voi tulla kansainvälisestikin merkittävä tekijä.

Tutkimuksen tavoitteena on esittää informatiivinen ja analyyttinen tietopaketti Luoteis-Venäjän kaivostoiminnasta ja metallinjalostuksesta sekä niihin liittyvistä toimialoista. Lisäksi analysoidaan klusterin kilpailukykyä ja sen kehitysnäkymiä. Tässä käytetään hyväksi Michael E. Porterin kehittämää klusterianalyysiä ja kilpailukyvyn timanttimallia.

Luoteis-Venäjän metallurgia- ja metallinjalostusklusteri muotoutui pääasiallisesti neuvostoaikana. Sen perustana olivat silloin tunnetut rautamalmivarat ja värimetallien sekä alumiinin raaka-aineiden esiintymät. Yksi Luoteis-Venäjän rautametallien tuotannolle tärkeimmistä vuosista oli 1958, jolloin sen suurin metallintuottaja, Vologdan alueella Tšerepovetsin kaupungissa sijaitseva Severstal valmisti ensimmäistä kertaa terästä. Alumiinin tuotannossa tärkein virstanpylväs oli vuosi 1932, jolloin Volhovin alumiinitehdas Leningradin alueella aloitti toimintansa. Tärkeä impulssi Luoteis-Venäjän värimetallien tuotannolle oli Murmanskin alueella sijaitsevan Petsamon liittäminen Venäjään toisen maailman sodan jälkeen. Siellä sijaitsevien malmiesiintymien ansiosta aloitettiin nikkelin ja muiden värimetallien tuotanto.

Klusterin muotoutumista edistivät Leningradissa (nykyisin Pietari) ja muualla Luoteis-Venäjällä sijaitsevat suuret metallinkäyttäjät ja koneen-

rakennusyritykset. Esimerkiksi Severstal, joka on yksi Venäjän suurimmista metallurgiayrityksistä, perustettiin lähelle tärkeimpiä kuluttajia mutta varsin kauas malmiesiintymistä, jotka sijaitsevat napapiirin toisella puolen. Klusterirakenne muodostui suljetun omavaraisen sosialistisen talouden oloissa. Sen rakennemuutos ja sopeutuminen uusiin taloudellisiin olosuhteisiin eli avoimeen markkinatalouteen on yhä kesken.

Tällä hetkellä metalliklusteri on tuotantomäärältään Luoteis-Venäjän johtava teollisuudenala energiaklusterin ohella. Sillä on suuri osuus monien alueiden kokonaistuotannosta. Vologdan alueen teollisuustuotannosta metalliklusterin osuus on 70 prosenttia, Murmanskin alueella lähes puolet ja Karjalan tasavallassa vajaat 20 prosenttia. Viimeisten kymmenen vuoden aikana yli puolet klusterin tuotannosta on suuntautunut vientiin, ja siksi ala on nyt aktiivisesti mukana kansainvälisessä kaupassa ja tulee yhä riippuvaisemmaksi teollisuuden globaaleista kehityssuuntauksista.

Metallituotteiden tuonnin ja viennin analyysi OECD-kauppatilastojen perusteella osoittaa, että Venäjän suurimmat vientimarkkinaosuudet ovat jalostamattomissa metalleissa, välituotteissa ja romumetalleissa. Näiden tuoteryhmien ansiosta Venäjällä on voimakkaasti positiivinen kauppatase. Samaan aikaan Venäjälle tuodaan suuria määriä pitkälle jalostettuja tuotteita, kuten putkia, alumiini- ja teräsrakenteita ja rakenteiden osia, muototerästä ja metallilevyjä. Tämä viittaa selvästi siihen, että tuontia korvaavaa toimintaa voitaisiin kehittää. Tämä puolestaan vaatii merkittäviä investointeja tuotantolaitosten uudistamiseen ja uusien rakentamiseen. Samalla olisi ryhdyttävä uudestaan kehittämään optimaalisimpien sijoituspaikkojen kilpailuetuja. Tarvitaan investointeja uusiin tuotantolaitoksiin ja vanhojen oleelliseen uudistamiseen sekä investointeja kilpailukykyiseen infrastruktuuriin, kuljetukseen ja logistiikkaan, energiahuoltoon ja pätevään työvoimaan. Vain hyvin harvat paikat Luoteis-Venäjällä täyttävät optimaalisen sijoittumispaikan kriteerit. Valtion rooli infrastruktuurin tarjoajana on hyvin tärkeä. Klusterianalyysissä onkin esitetty paljon valtion toimia tehostavia elinkeinopoliittisia ehdotuksia.

Hyvä esimerkki tuonnin korvaamisen mahdollisuuksista ja toisaalta vaikeuksista on investointi suurten putkien tuotantoon. Luoteis-Venäjällä ei ole soveltuvia tuotantolaitoksia halkaisijaltaan suurten putkien valmistamiseen. Kasvavan kotimaisen kysynnän tyydyttäminen vaatii siis kokonaan uusia tuotantolaitoksia ja näin ollen mittavia investointeja. Kilpailukykyisen infrastruktuurin ja toimintaympäristön lisäksi investoijat haluavat turvata tuotteilleen riittävät markkinat. Tuotannon olisi oltava kilpailukykyistä sekä kotimaassa että maailmanmarkkinoilla. Suuret kustannukset ja vienti-infrastruktuurin haavoittuvuus (kuljetuk-

set, tullaus jne.) sekä suurimpien kuluttajien kuten valtion hallinnassa olevien Gazpromin ja Transneftin epäröivä ja epävakaa ostopolitiikka ovat johtaneet siihen, että nämä projektit eivät etene ja putkia tuodaan Ukrainasta ja muista maista. Kaikesta huolimatta Luoteis-Venäjällä on nyt vireillä useita investointiprojekteja, joiden tarkoituksena on vastata kotimaiseen pitemmälle jalostettujen metallituotteiden kysyntään.

Luoteis-Venäjän metallurgia- ja metallinjalostusklusterille ovat ominaisia selkeät alueelliset erot. Kuola-Karjalan agglomeraatio on erikoistunut malmien louhintaan ja rikastukseen sekä värimetallien metallurgiaan. Luoteisella agglomeraatiolla on laajempi tuotevalikoima. Sen perusta on perusrautateollisuus, jota Severstal edustaa. Agglomeraatioon kuuluu kuitenkin myös useita värimetallurgian yrityksiä sekä Pietarissa sijaitsevia sekundäärimetallurgiaan ja värimetallien ja raudan jatkokäsittelyyn erikoistuneita yrityksiä. Komin tasavaltaan saattaisi muodostua myös uusi alumiinien agglomeraatio siellä vuonna 1997 aloitettujen suurten bauksiittiesiintymien louhinnan myötä.

On odotettavissa, että tulevaisuudessa tiettyjen alueiden kehitys johtaa toiminnan keskittymiseen niille alueille, joilla on parempi infrastruktuuri ja markkinamahdollisuudet. Tällaisiin paikkoihin ilmaantuu enemmän palvelujen ja teknologian tarjoajia, koska nämä paikat tarjoavat parhaan pääsyn markkinoille ja kasvavia skaalatuottoja. Korkeamman lisäarvon tuotteiden tuotanto voisi olla aktiivisempaa Pietarin ja Tšerepovetsin kaupungin lähettyvillä sekä luultavasti myös Syktyvkarissa.

Analyysimme osoittaa, että Luoteis-Venäjän metalliklusteri on vielä varsin hajanainen ja kehittymätön. Klusterin tulevan kilpailukyvyn edistämiseksi tärkeää on tavarantoimittajien ja niiden verkostojen, infrastruktuurin, energiantuotannon ja logistiikan kehittäminen. Neuvostoaikana muodostettiin suuria teollisia konserneja, joissa oli perustuotantoa ja muita niihin liittyviä toimintoja. Markkinatalouden ja yksityisomistajuuden olosuhteissa tällainen eri toimintojen keskittäminen samaan yritykseen muodostui raskaaksi taakaksi, joka heikensi merkittävästi yritysten kilpailukykyä. Nykyisin suurimpia kehitystarpeita ovat erikoistuminen ja tarve saavuttaa kustannusetua keskittymällä ydintoimintaan ja ulkoistamalla muita toimintoja. Vaikka tämä tarve tiedostetaan hyvin, ovat muutokset varsin hitaita. Ne vaativat suuria investointeja, paikallisten viranomaisten ponnisteluja ja kaikkien mukana olevien osapuolten sitoutumista. Monille metallurgia- ja metallinjalostusyrityksille niiden syrjäinen sijainti, välttämättömän infrastruktuurin hajanaisuus ja epätasainen kehitys sekä puute tavarantoimittajista ovat suuria kehitysesteitä, jotka johtavat tulevaisuudessa merkittäviin rakennemuutoksiin klusterissa. Suurten agglomeraatioiden kuten Pietarin kaupungin ja Tšerepovetsin sisällä tai läheisyydessä sijaitsevat yritykset hyötyvät

alueellisen keskittymisen skaalavaikutuksista ja kehittyvät paremmin kuin muut.

Muita klusterin tärkeitä elementtejä ovat erikoislaitteiden tuottajat, oppilaitokset sekä tutkimusinstituutit ja suunnittelutoimistot. Teollisuuden alamäellä on ollut negatiivinen vaikutus näiden toimintaan. Viimeisten kymmenen vuoden aikana niillä on ollut suuria vaikeuksia johtuen niiden riippuvuudesta vanhoista neuvostoaikaisista ratkaisuista, joka on merkinnyt huonoa kilpailukykyä. Tuloksena on ollut tarve investoida uudistamiseen ja mukautua kehitykseen. Tämä ei ole aina ollut mahdollista maan yleisen tilanteen takia. Koulutuksen, tutkimuksen ja tuotannon välisten aiemmin vahvojen yhteyksien katkeaminen, riittämätön rahoitus ja tästä seurannut käyttöomaisuuden rapautuminen ja pätevän henkilökunnan menettäminen ovat vaikuttaneet erittäin negatiivisesti kilpailukykyyn. Toisaalta terveimmät yksiköt ovat selvinneet ja niiden osalta yhteistyö T&K:n, koulutuksen ja yritysten välillä kehittyy.

Venäjän kuljetus- ja energiasektori ovat vielä valtion hallinnassa. Valtiolla voisi olla merkittävä rooli kotimaisten tuottajien kilpailukyvyn parantamisessa, jos se ohjaisi harkitsevasti ja koordinoidusti näiden sektorien uudistuksia. Energiamarkkinoiden vapauttamista ja rautateiden yksityistämistä seuraavilla muutoksilla voi olla hyvin suuri vaikutus yritysten kustannuksiin. Markkinoiden vapauttamisen ja yksityistämisen täytyy tapahtua koordinoidusti, jotta siirtyminen markkinahintoihin kävisi pehmeämmin.

Tutkijat osoittavat, että metalliklusterin neuvostoajalta perimiä tuotannontekijöitä – raaka-ainevaroja, tuotantolaitoksia, infrastruktuuria, koulutus- ja T&K-potentiaalia – on viimeisten kymmenen vuoden aikana hyödynnetty voimakkaasti. Niiden kehittämiseen ei kuitenkaan ole investoitu tarpeeksi, mikä on johtanut näiden tekijöiden hyödyntämismahdollisuuksien huomattavaan laskuun. On selvää, että klusteri tarvitsee merkittäviä investointeja. Maan poliittisen ja taloudellisen tilanteen parantaminen luo hyvän perustan ulkopuolisten investoijien houkuttelemiseen. Menestyvämmillä yrityksillä, esimerkiksi Severstalilla, on riittävästi omaa kassavirtaa investointeihin. Se investoikin säännöllisesti uudistamiseen ja tuotetarjontansa laajentamiseen.

Omistuksen uusjako Luoteis-Venäjällä metalliklusterissa on peruspiirteissään jo ohi, ja nyt yritykset voivat keskittyä toimintansa kehittämiseen. Samaan aikaan on kuitenkin nähtävissä tiettyjä negatiivisia piirteitä, kuten liiketoiminnan poikkeuksellisen alhainen läpinäkyvyys, kouluttamattoman työvoiman liian suuri määrä, mittavat sosiaalikulut ja ympäristön huomattava saastuminen. On odotettavissa, että tarve houkutella ulkopuolisia investointeja ajaa yritykset muuttamaan käytäntöjään ja parantamaan raportointiaan. Lähitulevaisuudessa Venäjän osake-

markkinoista voisi tulla tärkeä investointilähde klusterin yrityksille. Tämä sekä tarve ”laillistaa ansionsa” motivoi omistajia toimimaan läpinäkyvämmin.

On myös joukko muita tekijöitä, jotka ovat muovanneet Luoteis-Venäjän metalliklusterin nykyistä tuotantorakennetta. Näitä ovat alhaiset työvoimakustannukset (noin 1 USD/tunti) ja halpa energia (1,4 US senttiä/kWh, mikä on monta kertaa halvempi kuin useissa Euroopan maissa) sekä mahdollisuus säästää ympäristönsuojelutoimenpiteissä. On odotettavissa, että käynnissä olevat energiasektorin uudistukset, työvoiman laatuvaatimusten kohoaminen sekä kasvava paine maksaa korkeampia palkkoja nostavat näitä kustannuksia lyhyellä ja keskipitkällä aikavälillä. Tämä motivoi yrityksiä investoimaan nykyaikaisiin, tehokkaampiin teknologioihin ja ratkaisuihin. Edistykselle on tilaa, sillä Venäjän työvoiman tuottavuus on maailman alhaisimpien joukossa. Liikevaihto työntekijää kohti on alle 50 000 USD, kun se teollisuusmaissa on 150 000–400 000 USD. Investointeja ja uudistuksia tarvitaan pikaisesti parantamaan teknologiaa ja vähentämään päästöjä, jotka ovat vielä hyvin suuria. Valtionelinten sitoutuminen ja tuki näissä asioissa on ratkaisevan tärkeää liiketoiminnan kehittymiselle tällä sektorilla. Valtion toimilla ja politiikalla voidaan metalliklusteria merkittävästi vahvistaa tai heikentää.

Kotimainen kysyntä on elintärkeää kilpailukykyisten tuottajien kasvulle. Se on nyt vasta pääsemässä vauhtiin, kun markkinatalouteen siirtymistä seurannut teollisuuden syvä lama on väistymässä. Jo muutamia vuosia on kasvu ollut vakaata. Teräksen kysyntä vuonna 2001 oli jo yli 20 miljoonaa tonnia. Teräksen kulutus ja etenkin värimetallien kulutus per capita on hyvin alhainen Venäjällä – noin kymmenestä kolmeenkymmeneen prosenttiin länsimaisesta tasosta. Kysynnän odotetaan kasvavan, kun kotimainen teollisuustuotanto voimistuu ja väestön ostovoima kasvaa.

Klusterin tuotteiden kotimainen kysyntä laski dramaattisesti liberaalien talousuudistusten myötä ja selviytyäkseen alan yritysten täytyi viedä suurin osa tuotannostaan ulkomaille. Kuitenkin vain niukasti jalostetut venäläiset tuotteet ovat kilpailukykyisiä maailmanmarkkinoilla, mikä johti klusterin tuoterakenteen huomattavaan heikkenemiseen. Pidemmälle jalostettujen tuotteiden valmistamisesta oli luovuttava, koska ne eivät enää käyneet kaupaksi. Lisäksi venäläiset tuotteet syrjäytetään vähitellen teollisuusmaiden markkinoilla, ja tämä suuntaus näyttäisi jatkuvan lyhyellä ja keskipitkällä tähtäimellä. Toisaalta työ- ja energiaintensiivisen tuotannon siirtäminen pois teollisuusmaista sekä parempilaatuisten tuotteiden kysynnän kasvu kotimaassa todennäköisesti pysäyttävät kielteisen kehityksen ja kääntävät sen päinvastaiseksi. Venäläisen metal-

lin tärkeimmät markkinat ovat nyt teollistuvissa maissa. Näiden markkinoiden ennustettu kasvu, joka voi olla huomattavasti nopeampaa kuin teollisuusmaiden kasvu, tarjoaa hyviä mahdollisuuksia venäläisille tuottajille, jotka jo tuntevat nämä markkinat ja ovat saavuttaneet niillä hyvät asemat.

Tärkeä lähde tehokkuuden parantamiseksi ja kilpailuetujen saamiseksi Venäjällä on käytettyjen raaka-aineiden kasvava kierrätys. Toistaiseksi romumetallin kerääminen ja käsittely on yksi kriminalisoituneimmista aloista Venäjällä. Sääntöjen puute johtaa monenlaisiin menetyksiin, sillä jotkut yrittävät myydä romuksi hyvinkin tärkeitä tuotteita – jopa tuotantovälineitä. Toisaalta romun keräyksen ja käsittelyn puutteellisuudet ja ongelmat motivoivat pimeään toimintaan, varsinkin kun on lähes mahdotonta noudattaa kaikkia lukuisista ja ristiriitaisista säädöksistä. Kotimainen tuotanto hyötyisi merkittävästi tehokkaasta ja läpinäkyvästä romunkeräyksestä ja -käsittelystä.

Luoteis-Venäjän metallurgia- ja metalliteollisuusklusterin kilpailukyvyn kehittäminen vaatii huomattavia parannuksia kansallisessa ja alueellisessa sekä teollisuuden investointi-ilmapiirissä. Tämä lisäisi sijoituksia klusteriin merkittävästi. Myös kotimaan markkinoiden – etupäässä koneenrakennuksen ja rakennustoiminnan laajentaminen on ratkaisevan tärkeää, koska se on ehkä ainoa tapa parantaa tuoterakennetta ja lisätä pitkälle jalostettujen tuotteiden osuutta.

Kuten case-yritysten analyysi on osoittanut, huolimatta siirtymävaikeuksista ja siihen liittyvistä kysynnän muutoksista monet yritykset onnistuivat sopeutumaan. Nyt niiden toiminta kehittyy asteittain uudistusten jälkeen. Keskittyminen johti voimakkaiden yksityisten konsernien muodostumiseen. Isot konsernit pystyvät keräämään jo merkittäviä kassavirtoja, jolloin seuraava looginen askel on investoinnit tehokkaampiin ja nykyaikaisempiin teknologioihin ja menetelmiin. Alueiden ja koko Venäjän hallinto voisivat edistää tätä uudistumista huomattavasti koordinoiduilla toimenpiteillä, ja tarjoamalla paremman infrastruktuurin ja toimintaympäristön teollisuudelle.

1 Introduction

The cluster of metallurgy and metal-working (metal cluster) is one of the basic industries in the Russian economy. In Northwest Russia, it holds the largest share of industrial clusters output in monetary terms, and the dynamics of its development greatly influence the economic environment both within the metal cluster agglomerations, and in Northwest Russia as a whole.

Main production facilities of the cluster in Northwest Russia (as well as supporting infrastructure, training and research institutions) were created during the Soviet period. It was then that the largest ferrous and non-ferrous metals ore deposits were developed and the large vertically integrated plants of primary metallurgy were built. Output of these plants was used by the developed machine-building industry of Leningrad (now St. Petersburg), Arkhangelsk, Petrozavodsk and other cities of Northwest Russia and beyond. The main consumers of metals were enterprises of the military complex, as well as several civil industries, such as shipbuilding, energy machine building and construction. Metal consumption in the Soviet Union was one of the highest in the world, and only a small fraction of the cluster output was exported.

Structure of demand was at the time balanced, and included both primary products, and products with a higher added value (special steels and alloys, as well as intermediary products). The latter were mostly produced within the machine building enterprises that usually included secondary metallurgy and metal-working plants. Thus, a geographical gap was created between primary metallurgy and metal-working enterprises.

Collapse of the USSR and liberal economic reforms in Russia greatly influenced the cluster of metallurgy and metal-working. The domestic market for its products shrank rapidly due to the permanent recession of the machine-building industry (accounted for mainly by sharp reduction of state orders for military and civil machinery, as well as by the industry's low competitiveness in the world market). The crisis in the machine-building sector triggered recession in the supplying metal-working industry. On the contrary, enterprises of primary metallurgy found themselves in a safer position (their output also fell, but only by a little, not two or three-fold) due to price competitiveness of Russian raw materials and metal production in the world market and the consequent high export potential. Thus, the period of reforms led not only to changes in ownership of most companies, but, more importantly, to major shifts in production structure and the overall structure of the cluster.

It is the analysis of these developments, which led to the present situation in the cluster of metallurgy and metal working in Northwest Russia, as well as the basic trends for future development, that this paper aims to provide. The main targets of this research are thus the following:

- Analysis of the current competitiveness of the Northwest Russian metallurgy and metal-working cluster, and the factors that influence creation and development of competitive advantages;
- Assessment of the potential and the possible growth directions of the Northwest Russian metallurgy and metal-working cluster;
- Creation of an informational and analytical database for defining strategic solutions in the fields of industrial policy, investments and business development of metal-related companies.

The study includes the critical analysis of statistical material (OECD, Organization for Economic Cooperation and Development, Goskomstat of Russia – State Committee of Statistics), data from Russian and international industrial associations, and analytical material received from official and other open sources.

It should be noted that Russian statistics traditionally account for metallurgy industry indicators separately from those of the metal-working industry. Statistics for the latter are combined with data on the machine-building industry, since the majority of metal-working facilities are located within machine-building enterprises. This creates certain difficulties, both in evaluating aggregate indicators for the cluster, and in comparing economic indicators for metallurgy and metal-working separately. That is why the authors decided to address metallurgy and metal-working jointly within each of the two sub-sectors of the cluster: ferrous and non-ferrous metals.

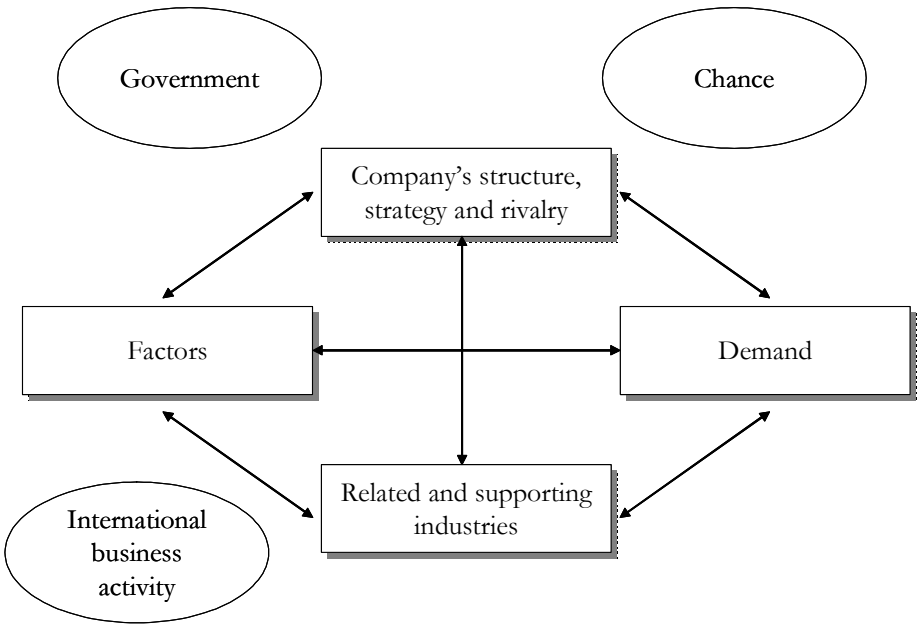
The research introduces the first attempt to present statistical and analytical material accumulated in Russia and to apply the new methodology, which presently is widely used in many leading countries of the world. The main emphasis of the research is made on the analysis of the factors that determine current and future competitiveness of Northwest Russia metallurgy and metal-working cluster.

2 Theoretical Framework

2.1 Introduction

The present study is inspired by the influential book *The Competitive Advantage of Nations*, published in 1990 by Michael Porter, a professor of Harvard University, and by later research on matters related to regional development and competitive advantages (see Box 2.1 below). In the approach presented in his book, Michael Porter describes how companies find sources of competitive advantages in the specific combinations of skills and networks created in their industries and around it in specific countries and regions. He also studied the competitiveness of nations and regions in terms of their ability to offer companies an environment that provides unique advantages embedded in the networks and industrial structure of those particular regions. The study was grounded in detailed case studies of regions that are known for their persistent ability to provide the world with companies that are able to outperform others, such as Silicon Valley, Detroit, northwest and central Italy, etc.

Figure 2.1 "Diamond" Model



As a main tool in the analysis presented in M. Porter Study the "Diamond" model of national competitiveness was introduced (presented in

Figure 2.1). In this study this model is also used, although slightly adjusted (for more information see box below), as a key tool for assessing and analyzing the competitiveness of Northwest Russia. Although, initially, Michael Porter used this model for studying national competitiveness, it was later tested to fit the studies of regions that are positioned within boundaries of certain countries, or even to regions that comprise neighboring areas of different countries.

The "Diamond" model distinguishes four main sources of competitive advantage. These are

- *Factors:* This category includes production factors such as natural resources and geographical location, as well as created factors inherited from preceding stages. The first group can include natural resources, demographic conditions, geographical location, etc. The second group usually includes production facilities, and positions on various markets, infrastructure, human capital and R&D potential.
- *Demand:* The presence of a sufficient demand for the primary goods is the necessary condition of development and a source of competitive advantage. Here it is important that existing demand allows achieving economies of scale in local production. This demand is formed by local and export constituents. The local demand is a necessary starting source for creating competitive advantages for firms that will cluster in the region, thus reinforcing local advantages. Such specific characteristics of domestic demand as high quality and diversification requirements of consumers, or user-producer cooperation and consequent demand for specific solutions and product/service combinations, which for certain reasons were not possible in the other regions, substantially enforce the sustainability of competitive advantages of domestic producers. In certain industries, the strong and rapidly growing export market and demanding foreign customers played an essential role in formation of competitive domestic producers as well. In this case access to the foreign markets played a key role in formation of the competitive advantage.
- *Related and Supporting Industries:* The existence of developed related and supporting industries could be a source of competitive advantage for regional companies due to the possibility of obtaining advantages from the early access to high quality and reliable supplies of essential and unique or rare components and materials, from the cost advantages gained from the competitive local supplies. This also allows for an increase of production efficiency as a result of specialization. An available developed system of subcontractors and suppliers in a given region makes it possible to offer more complex products and after-

sale service systems. It creates a unique local system of industrial co-operation that exceeds and surpasses similar competitors' systems by their possibilities and degree of development.

- *Company's Structure, Strategy and Rivalry:* The industry structure is an important determinant of the possibility to gaining competitive advantage if the industries are competitive and the competition motivates leading companies to invest in the product and market offering, management and marketing as well as process development. In this case the larger markets for essential supplies and components are created, infrastructure could be better targeted to meet specific requirements of the particular industries, the competitive pressures also motivate higher organizational efficiency and training as well as spin-offs.

Porter offers for consideration two additional areas from which companies are able to draw sources of competitive advantage in his model:

- *Chance:* The role of chance or "luck" reflects rapid changes on world financial markets; changes in currency quotations, an unexpected growth in local/international demand and the event of war. All these sudden and unexpected events create situations on the market when unforeseen opportunities are created. In some cases these opportunities could become a source of competitive advantage.
- *Government:* The influence of government, through its current policy (liberal, deterrent, etc.), is only considered as an attribute in analysis. However, this policy determines the performance of all actors in the regional and/or national economy. A rational governmental policy provides for the growth of potential investor confidence and attracts capital, experience and technology to the economy.

As a result of studies of globalization, another potential source of competitive advantage was later added to Porter's "Diamond" model of national competitiveness: this is international business activity.

International business activity became a source of competitive advantage for companies from particular regions as a result of their internationalization, i.e. their ability to locate production facilities in regions that could offer the best advantages for the particular activity, and thus gain from access to several "diamonds" of the national advantage simultaneously.

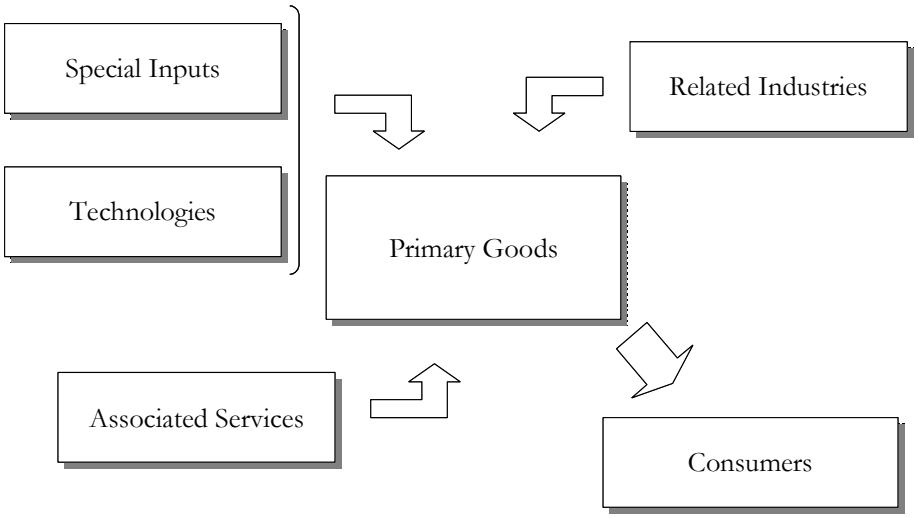
2.2 Concept of the Cluster

As we discussed earlier in this Chapter the regional competitiveness is based on the ability of the particular location to offer the firms opportunities to gain competitive advantage owing to the specific factor and demand condi-

tions, high demand and quality conscious consumers, and developed networks of competitive companies in related and supporting industries located in this region.

Cluster analysis presumes that no specific industry can be viewed separately from others, but should be analyzed systematically within a cluster of vertically and horizontally linked sectors. It is obvious that the development of a key industry would give a push to the development of supplying and consuming industries, as well as service segments associated with the cluster.

Figure 2.2 Cluster Structure



A cluster structure can be illustrated as a set of separate, but closely interrelating sectors of the regional/national economy, as well as special inputs inherent for the region. There are the following elements in a cluster:

- *Primary goods* – a list of goods or groups of goods, which are competitive on the world market and companies manufacturing these products form the core of the cluster.
- *Specialty inputs* – the main factors of production inherent for the country (region) are the raw materials, transport, infrastructure, labor force, educational system, R&D etc.
- *Technologies* – a description of key technologies, machines and equipment consumed by the core sector of the cluster and its producers, located in the same region.
- *Related and supporting industries* – the different sectors of the economy and particular companies, whose products are directly or indirectly consumed or may be consumed by the core sector.

- *Consumers* – the main consumers of primary goods manufactured by the companies of the cluster.

An analysis and understanding of the cluster and its structure can help companies to create focused development strategies, and authorities to identify the sources of competitiveness in their particular regions, and to create on the basis of this an efficient and active system of general development, of infrastructure and operational environment improvements, including relevant regulatory acts, actions and decrees of the legislative power.

Although there is an extensive body of theory and research behind the matters presented in this chapter we do not dare to bother readers with further explanations and would like to proceed to the analysis presented in the following text. Those who are interested to learn more we ask to refer to the forthcoming book "Advantage Northwest Russia" by Grigory Dudarev, Hannu Hernesniemi and others where these issues will be addressed in more detail. A short summary of theoretical routes used as knowledge basis for the study is presented below in Box 2.1.

Box 2.1 Theoretical Routes

It was long time a widely accepted fact that national and regional location is central to growth, increased welfare and well-being. Already in the end of the 19th century Alfred Marshall introduced "industrial districts", later Joseph Schumpeter – "innovation clusters", Eric Dahmen – "development blocks", François Perroux – "development and growth poles", economic geographers – industrial and "high-technology" agglomerations. These concepts assessed the geographic concentration of economic activities and innovation from different perspectives. Going here deeper into the intellectual history underlying these approaches and the difficulties of making the above concepts analytically operational is beyond the scope of the present review. Nevertheless we will touch upon their implications that were integrated into the approach used in our study. The reason why these concepts were not successful was not because policy makers did not consider them important: the source of growth and the origins of disparities have remained central to the preoccupations of policy makers and analysts. The unresolved issues that underlie the wide use of the "cluster" concept are related to the following questions: Why do activities cluster? Why is clustering important? How can the clustering process be managed? Is that possible? What are the possible tools and factors that could influence clustering in certain regions? Can, and should, one do something about it?

Michael Porter in his book "The Competitive Advantage of Nations" presented some answers and explanations for many of the above questions. He incorporated implicitly many previous developments, mentioned above in the knowledge base (Rouvinen and Ylä-Anttila, 1999). Although, according to these authors, the framework presented by Porter is rewrap of old ideas, they agree that the "diamond" model is internally consistent and in the line with

the mainstream competitiveness literature. The ambiguities surrounding the cluster concept (and other related concepts such as industrial districts), proper definitions, and their relationships to regional economic performance are the subject of extensive literature (Asheim and Isaksen, 1997; Feser, 1998a, 1998b; Harrison, 1992; Heinenreich, 1996; Isaksen, 1997; Jacobs and de Man, 1996; Kaufman et al., 1994; Park and Markusen, 1995; Steiner, 1998).

Notwithstanding the fact that this model is obviously a good and comprehensive tool to assess competitiveness and clusters, i.e. represents a certain advance in this area, it has some drawbacks. As Penttinen demonstrated in 1994 they are the following: competitiveness can also be found outside clusters; the diamond model does not properly account for foreign direct investment and multinational enterprise; the model may not be suited to small open economies (as it was suggested by Rouvinen and Ylä-Anttila, 1999 we also used broader cluster definitions); the model may not be applicable to resource-based industries (Rouvinen and Ylä-Anttila, 1999 applied the model to resource-based industries successfully); the role of macroeconomic variables in the Porter's model is unclear; it is unclear whether model is dynamic or static; the studies may not be conducted with sufficient rigour (the loosely defined theory offers possibilities for misuse).

One of the main advantages of the Porter model was that it remarkably departed from traditional analysis and integrated the new, more up-to-date developments in theory such as cluster-based approach. The main differences between traditional and cluster-based approach are that by specifying strict boundaries for industries or sectors (mostly based on statistical data accounting procedures), the traditional sectoral approach fails to take into account the importance of interconnections and knowledge flows within a network of production (Rouvinen and Ylä-Anttila, 1999).

The cluster-based approach also has substantial importance as a tool to study regional development issues. Empirical studies today are far more frequently conducted on the sub-national level (Nelson, 1993, Ohmae, 1995) and often patterned after Porters' model of competitive advantage. There is also a substantial contemporary research in regional development (Russo, Storper and Scott, von Hippel) and sources of competitive advantages (Barney, 1992 a, 1992 b, Asanuma, 1989, Dyer) that complements Porter's model in a major way adding more understanding and insight into the localization of process of the knowledge creation and diffusion, learning, etc.

In conventional macroeconomics the markets are characterized by anonymous relationships between suppliers and users. Anonymity according to Gibbons and Weijers complicates product innovation because new product development requires effective transfer of specific cost and performance needs knowledge from the potential user to the would-be producer. The challenges of the product innovation process are well captured by Lundvall who stated that reciprocal information flows between producers and users are essential to successful innovation. Rothwell who introduced the notion there are two main interfaces in user-producer interactions extended this view. These are the interface between the supplier and the producer and the producer and the customer. The above arguments stress importance of geographical proximity, personal knowledge and trust in the development of new products through user-producer cooperation.

John Holmes studying the Californian agglomeration went along theoretical lines of transaction cost theory. He rooted flexibility in the division of labour in production and linked that to agglomeration via analysis of the transaction costs associated with the interfirm linkages, i.e. traded exchange. This analysis is parallel to a major trend in business economics, i.e. that of network forms of production. The transaction cost theory is about the allocation through cost-minimization owing to its concentration on the traded input-output relationships. The evolutionary theory and knowledge based view in the strategic management open the way to understanding "untraded" interdependencies, which does not appear in recorded input-output transactions (Storper, 1997, Storper and Salais, 1992).

Another significant challenge and difficulty in the present study was to assess the transition to the market economy and its impact on clusters and competitiveness. In this respect one shall mention the territorial-industrial complexes by Kolosovsky (1969) approach that included creation of both production facilities and a network of specialized higher educational establishments and R&D organizations in the certain region that was a central national and regional industrial policy and planning tool in the Soviet period. Implementation of this approach resulted in the major distortions in the production allocation decisions and, as a result of the on-going changes, the regional industrial landscape is bound to change substantially in Russia. We believe that material presented in our study could shed some light on the processes of re-allocation in the Russian economy. We used also Porter diamond model to assess the regional competitiveness in Northwest Russia. Brown and Brown (1998) examined empirically the structure-conduct-performance paradigm in Russia and found supporting evidence. Therefore we believe that there is at least some evidence that one of the corner stones of the Porter approach, i.e. industrial organization approach is suitable to assess the period of transition.

3 Identification of the Metal Cluster of Northwest Russia

3.1 Brief History of the Cluster

Before the Soviet Period

The first metallurgy and metal-working companies in Northwest Russia date back to the 18th century. They emerged during the times of Peter the Great as a result of the Russian territorial expansion in the Baltic region and army needs in new weapons. The first iron foundries to make cast iron of lake and marsh ores were set up in Olonets (the Republic of Karelia) and on the Sysola River (the Republic of Komi). The first metal-working production – cannon moulding for the Russian army and fleet – was established in Petrozavodsk (the Republic of Karelia).

The first enterprises that appeared in St. Petersburg and its surroundings (Liteiny Dvor, from 1720 called the Arsenal, and the Sestroretsk metal works) were established in order to provide the Russian army with weapons. Later, metallurgy production began to expand and develop on the basis of other production facilities, first of all sawmills. For example, Izhora plant that used to specialise on wood sawing, from 1762 started to produce anchors.

A number of new plants were established in St. Petersburg during the 19th century: Putilov Plants (now called Kirov Plants), Aleksandrov Plants (now called Proletarian Plants), Baltic Plants, etc. In 1857 the first copper-rolling plant was set up (now called Krasny Vyborzhets). By the beginning of the 20th century steel and metal ware production was concentrated in the state and private plants of St. Petersburg. The industry was characterised by a large share of the foreign capital. The technologies developed in accordance with the world trends. For example, in 1872-1873 open-hearth furnaces were introduced in Obukhov and Putilov Plants; and in 1911-1915 the first electric furnaces were installed there. At the same time, metallurgy companies developed contacts with research institutions that were formed on the basis of specialised departments in the Polytechnical and Mining Institutes.

Soviet Period

During the Soviet period, metallurgy and metal-working enterprises in Leningrad were reconstructed, new furnaces and rolling mills were

introduced. As a result of further development of machine building industry (first of all – shipbuilding, power engineering) the Leningrad manufacturers focused mainly on production of special steels and pre-processed intermediary products.

Cherepovets Metallurgy Plant (now called Severstal) was established in order to supply the Leningrad machine building enterprises with primary metals. This plant was oriented to consume iron-ore of Kola peninsula and coking coals of Vorkuta area. In the mid 80's a new source of raw materials emerged – iron-ore deposit in Kostomuksha (the Republic of Karelia). The construction of the new ore-enrichment plant there was carried out in cooperation with Finland.

Box 3.1 Severstal – Planning and Construction of the Largest Enterprise in Northwest Russia

The idea of establishing metal plants in Northwest Russia originates from Peter the Great. However, due to the scarcity of local natural resources it was not realized then, and only in early 1930s, when large deposits of iron ores (Kola Peninsula) and coking coals (Pechora basin in Republic of Komi) were found in the region, the idea gained momentum. Then it was important to develop primary metallurgy in order to provide supplies for machine building facilities in Leningrad, as well as in Moscow, Arkhangelsk, Nizhny Novgorod and Yaroslavl.

Initial projects proposed organizing full cycle metallurgy plants at the ore deposit locations (Kandalaksha in Murmansk Region) or at coal basins (Vorkuta in Republic of Komi). Later these plans were reformulated and economic feasibility of building metallurgy facilities farther from the resources, but closer to the consumers in Leningrad and Moscow was proved. In 1940 Joseph Stalin chose the location for a major metallurgy complex in Cherepovets, a town with sufficient population, equidistant from Leningrad and Moscow and close to railway links and inland waterways (Volga-Baltic canal).

World War II delayed construction of the plant, which was started only in 1948. At the time feasibility of location was questioned once again, and alternative locations in Arkhangelsk, Petrozavodsk, Belomorsk (Republic of Karelia), Kotlas (Arkhangelsk Region), Lodeinoye Pole (Leningrad Region) and Annensky Most (Vologda Region) were hotly debated. There also were proposals not to build a single big plant, but instead to develop a number of specialized plants for separate stages of metal-production cycle. However, under centralized planned economy top-level decisions were seldom revised once they had been made, and construction was finally started in Cherepovets, mainly with the use of labour provided by the prisoner camp system.

In 1955 the Cherepovets Metallurgy Plant provided the first pig iron, and in 1958 the first of steel. During the first years of operation the plant was unprofitable, which was aggravated by the fact that local peat could not be used for fuel, as had been expected. There even were discussions of discon-

tinuing production, but in 1958 the authorities instead decided to expand the facilities by 2.7 times. In the 60s annual production capacity of the plant reached 12 million tons of steel (compared to 2 million tons in the initial project).

At the same time the Soviet government finally decided to discontinue projects for development of several specialized metallurgy enterprises in the region, and to concentrate the whole metallurgy cycle at one location in Cherepovets.

Such was the history of establishing the biggest ferrous metallurgy facility of Northwest Russia and one of the "dirtiest" Russian enterprises of the century whose volume of emissions in the Soviet period amounted to 600 000 tons per year.

Non-ferrous metallurgy was developing during the Soviet period as well. From 1923 the bauxite deposits of the Leningrad region were put to use, and from 1932 Volkhov Aluminum Plant located around the same area was put into operation. From the 30's development of Kola mining and metallurgy region began. Aluminum plants were established in Kandalaksha (Murmansk Region) and Nadvoitsy (Republic of Karelia) based on the nephelines of Khibiny deposits; brass-and-nickel work was set up in Monchegorsk (Murmansk Region). Pechenga area (annexed to Russia after World War II) became an important source of nickel ore.

Educational and R&D potential continued to grow in Leningrad. Personnel training for metallurgy enterprises started to develop in Cherepovets (Vologda Region), too.

On the whole, during the Soviet period metallurgy and metalworking enterprises were to a large extent oriented at supplying the needs of domestic mechanical engineering companies. Despite the high production volumes (the USSR was the world largest producer of ferrous metals and nickel, second largest – of aluminum and copper) exports did not play a key role in the cluster development – the share of exports was less than 10%. As compared with developed countries Russian enterprises were characterised by relatively low labour productivity, high material and energy costs per unit of production, and very intensive environmental emissions.

Transition Period

Transformation of the Russian economy in the 1990's led to substantial changes. Machine building experienced a deep crisis because of

sharp decrease in government orders and low competitiveness of its products on the world market. Due to that metal-working also experienced deep recession. On the other hand, the metallurgy enterprises, to a large extent oriented at primary metal products, made the most of the new opportunities to take the lead in the cluster. As a result, the slump in production experienced by the metallurgy was relatively small, compared to other Russian industries.

Table 3.1 Ferrous Metallurgy Output in Northwest Russia in 1990-2000, Thousand Tons

	1990	1996	1998	1999	2000
Iron ore	20,998	12,417	13,792	14,527	14,153
Steel	13,342	9,510	9,110	9,680	10,222
Rolled metal	10,922	7,778	7,730	8,196	8,662
Coated sheet and plate	284	456	466	469	468
Steel shapes (high accuracy)	70.5	19.9	22.1	19.1	26.5
Steel pipes	406	168	189	229	283
Wares of special types of steel	107	42.3	48.7	55.8	79.3

Source: Goskomstat (Russian State Committee for Statistics), 2001

Favourable conditions for exports after the financial crisis of the August 1998 promoted the growth of metallurgy sector, and at present production volumes by many positions are not far from those achieved before the Transition period. However, the current situation in the sector is not stable due to increased dependency on world market conditions and political issues. The slow growth of the main metal-consuming industries (heavy machine building, construction) noted during the last few years cannot as yet substantially expand the domestic market for the companies of the cluster.

During the transition period metal sector has undergone sweeping privatisation. Presently, property redistribution is still continuing, the business is characterised by low transparency, and a large number of shadow and criminal operations take place.

Territorial and production gap between metallurgy and metal-working inherited from the Soviet period still exists. Metal-working still combines with machine-building, and often occupies leading positions in export volumes of large machine-building companies owing to higher export potential.

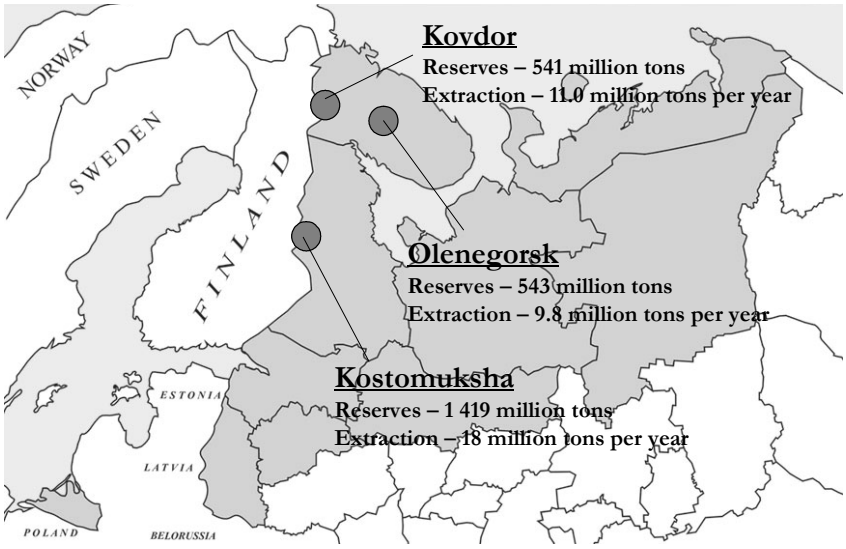
3.2 Ore Resources in Northwest Russia

Northwest ore resources for metallurgy are represented by the large exploited deposits of bauxites, apatite-nepheline, copper-nickel and iron ores. There are some proved but still non-exploited deposits, too.

Ferrous Ores

Iron ores in Northwest Russia are represented by the deposits of the Karelia-and-Kola iron-ore province, which includes the Murmansk region and the Republic of Karelia.

Figure 3.1 Exploited Iron Ore Deposits in Northwest Russia



Source: A. Smyslov, Mineral Wealth of Russia, 2001

The reserves of iron ore in the Karelia-and-Kola province made up 3,197 million tons in 1994, which was 3.2% of the total Russian stock. About 75% of it are ferruginous quartzites, 24% – apatite-magnetite ores, 1% – titanic-magnetite ores.

The ores quality here is a little lower compared to the other iron-ore Russian provinces, as the average iron content of the Kola Peninsula deposits is 30.4%, while the average in Russia is 35.9%. The reserves of the Karelia-and-Kola province are concentrated in the Murmansk region – 1,640 million tons (54.7%) and the Republic of Karelia – 1,557 million tons (45.3%).

The province occupies the third position in Russia by the total output volume of iron ore after the Kursk iron ore province and the Urals. At present seven iron-ore deposits are exploited in the region. Open-cut mining is used for iron ore extraction, which is carried out by the three mining-and-enrichment plants (Russian abbreviation – GOK): Olenegorsk GOK, Kovdor GOK, and Kostomuksha GOK. The supplies for the future extractions make up 9-17, 20, and 55 years respectively.

Olcon (Olenegorsk GOK) works four ferruginous quartzite deposits located nearby. In the year 2000 about 9.8 million tons of ore was extracted (while the potential output of the quarries is 11.4 million tons), out of which 3.9 million tons of iron-ore concentrate (Fe content 65.9%) was produced. At the beginning of 1999, the reserves made up 543 million tons, including 100 million tons for open-cut mining. There are reserves to provide open-cut mining for 8-12 years, after that underground mining will begin.

Kovdor GOK works Kovdor deposit of baddeleyite-apatite-magnetite complex ore. The quarry's annual potential ore output is 16 million tons. In the year 2000 about 11 million tons of ore were extracted. The reserves left at the beginning of 2001 made up 541 million tons.

Karelsky Okatysh (former Kostomuksha GOK) works the reserves of Kostomuksha ore area. In addition, there are the reserves of Korpanga deposit located nearby. Total reserves made up 1,419 million tons (at the beginning of 1994), including Kostomuksha deposit – 1,092 million tons, and Korpanga deposit – 327 million tons. Potential ore output of the quarry is 24 million tons per year, and the potential output of the ore-enrichment plant is 8.8 million tons of iron-ore pellets per year.

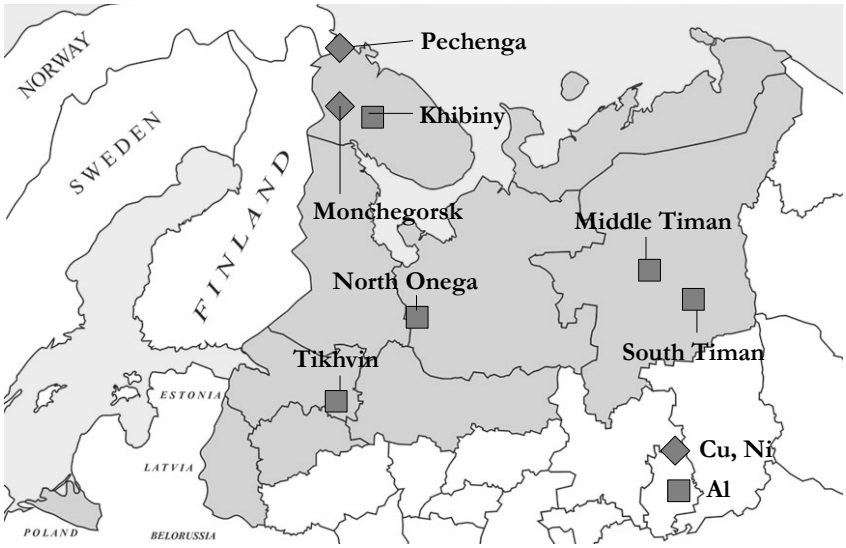
At present, the Severstal holding, which controls Kostomuksha and Olenegorsk, tends to discontinue further development of the Olenegorsk deposits. Instead, the company plans to purchase the cheaper and higher quality ore from the Kursk iron ore province, which is located from Cherepovets even nearly than the Kola Peninsula ore deposits.

There are no significant deposits of other ferrous metals ores, primarily manganese and chromium, in Northwest Russia. However, there is a significant deposit of chromium ores recently prospected in Republic of Komi, which, in view of current lack of such resources in Russia, is certainly going to be developed in future.

Non-ferrous Ores

The region has ore reserves for aluminum, copper, nickel and some other non-ferrous metals production.

Figure 3.2 Exploited Non-ferrous Ores Deposits in North-west Russia



Source: A. Smyslov, Mineral Wealth of Russia, 2001

Aluminum deposits of Northwest Russia are represented mainly by bauxite deposits, located in the Leningrad, Arkhangelsk regions and the Republic of Komi, and by nepheline ores of the Kola peninsula.

Four large bauxite areas are located in Northwest Russia – Tikhvin, North Onega, Middle Timan and South Timan. The total bauxite reserves in these areas make up 400 million tons, which is 50% of the total bauxite reserves of Russia. At the same time a significant share of the reserves in concentrated in small deposits, many of which are located in hardly to access areas. Bauxites of Northwest Russia are of medium and low quality, which require considerable costs for alumina production.

Tikhvin area is the oldest bauxite area to exploit in Russia. It includes more than 30 small deposits. Many of them are already exhausted.

North Onega area includes 4 deposits. This area has the largest reserves of bauxite among the other bauxite areas of Russia. The mining is open-cut. However, due to difficulties connected with mining and geological conditions and low quality of the bauxites, the output volumes here are not very big. Most part of mined bauxites are used in non-metallurgy industries; only a small part is processed at the Boksitogorsk Alumina Plant.

Middle Timan area is one of the most promising, and it is also one of the rare examples of deposits developed during the Transition period, in late 90s.

Box 3.2 Timan Bauxite – the Biggest Non-ferrous Ore Deposit Development Project in Northwest Russia

At present one of the biggest problems of aluminum industry in Russia is the problem of raw materials: for the current annual production volume of aluminum of 3.3 million tons the volume of bauxite extraction is only about 2.5 million tons, while in order to produce 1 ton of aluminum about 7-9 tons of bauxites are required. It should be also noted that conditions of extraction are becoming more difficult, and that the quality and quantity of bauxites in the developed deposits has also deteriorated.

Background. The Middle Timan deposit was found over 30 years ago, but its industrial development was started only in late 1997. The deposit is characterized by high and medium-quality of bauxites, as well as by a relatively low depth of occurrence, so about 40% of ore reserves may be developed by the open-pit method. Prospected reserves of the deposit amount to 250 million tons (about 30% of all bauxite reserves in Russia). The distinguishing feature of the Timan bauxites is presence of accompanying components, including gallium, vanadium and scandium.

Project implementation. The project is operated by the Timan Bauxite company (controlled by SUAL Holding). Planned annual production capacity of the enterprise in accordance with the project is 500,000 tons of bauxites. At present, documentation is being prepared for an enterprise with annual output of 2.6 million tons, and the enterprise is going to become the main extraction facility of SUAL Holding.

In 2001 the volume of extraction reached the level of 662,200 tons of bauxites, most of which were supplied to the plants of SUAL Holding located in the Urals and in Leningrad Region.

Investment. Total investment of the SUAL Holding into the project of development of Middle Timan bauxite deposit is estimated at USD 100 million, including USD 66 million spent on 160-kilometer railway link and USD 30 million for development of the deposit itself.

At the same time, the company is considering the possibility of constructing an alumina-and-aluminum complex capable of producing over 1 million tons of alumina and over 500,000 tons of primary aluminum per year. According to preliminary estimates, the cost of this project amounts to about USD 2 billon. Presently, SUAL holding has already signed a contract with Hatch Associates for feasibility study for construction of this complex.

The South Timan area comprises 3 deposits. The deposits can be open-cut mined. Most of the potential bauxite areas of this region are still insufficiently explored.

Besides bauxites aluminum natural resources are represented by nepheline ores deposits. Nepheline reserves in the apatite-nepheline ores of the Kola peninsula make up 1.7 billion tons or 580 million tons of aluminum oxide (about 70% of the total Russian reserves).

As more and more low-quality ores are involved into processing, tailing dumps of Apatite (the company, which is mining apatite-nepheline ores) are becoming of practical interest. During the long period they have accumulated up to 30 million tons enriched waste annually, which contain about 18 million tons of nepheline.

On the whole, it may be claimed that, compared to other regions of Russia, Northwest Russia is best of all provided with aluminum ores sufficient both for the existing facilities, and for a new, possibly larger, enterprise.

Copper and nickel deposits of Northwest Russia are represented by complex sulphide copper-nickel ores of the Kola peninsula. Most of the ores are of low quality. The reserves are concentrated in the 13 deposits and represent the second important resources area for nickel production in Russia after Norilsk.

At present there are four main ore areas – Pechenga, Allarechensk, Monchegorsk and Kola. The main one is Pechenga, where more than 30% of total reserves of copper-nickel ores are concentrated. Presently five deposits are exploited in Pechenga and Allarechensk areas. The largest deposit has 70.1% of nickel reserves of the total nickel reserves in the Pechenga area. Currently exploited quarries have supplies to provide only 8.5 more years of extraction.

The total ore output (Ni 0.70%, Cu 0.33%) was 6.8 million tons in the year 2000. Converter matte, which is derived after enrichment in the Pechenganickel company, then is supplied to Severonickel plant for further metallurgy processing.

Besides nickel and copper the ores also contain cobalt, platinum metals, gold, silver, and rare-earth metals. The technology of complex ore processing has been developed, but large-scale production has not begun yet. In future, due to depletion of easily-available reserves of nickel ores, Norilsk Nickel, that controls Pechenganickel and Severonickel, is planning to concentrate on production in this region of the accompanying metals, such as cobalt, platinum metals and rare-earth metals.

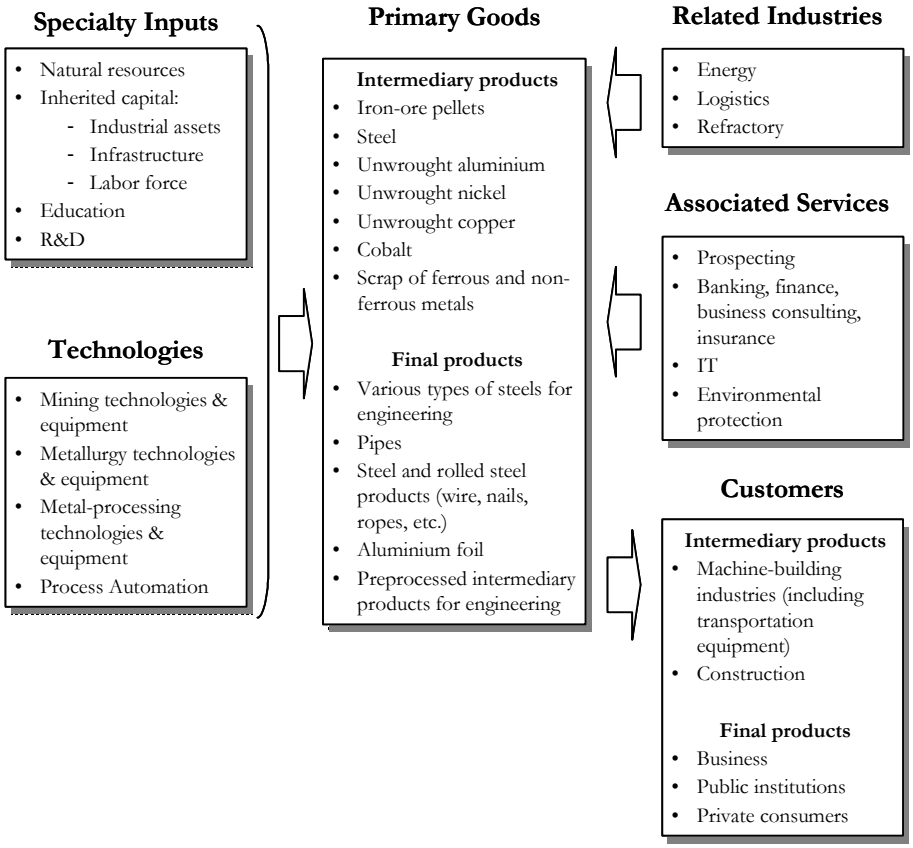
To conclude the review of the ore base of metallurgy industry in Northwest Russia it should be noted that all developed and prospected deposits were found during the Soviet period, when the State provided substantial financing of geological prospecting and explora-

tion, while during the last decade this financing was almost totally discontinued, and the private companies provide funding only for additional surveys within the deposits which have already been prospected. There are no complex large-scale geological projects aimed at finding new deposits and, as a result, depletion of natural resources is not compensated by an increase in new resources, which leads to gradual deterioration of the raw materials base of the Russian metallurgy industry.

3.3 Cluster Structure

Northwest Russia possesses substantial metallurgy and metal-working production capacity and infrastructure, including related and supporting industries and well-developed educational and R&D potentials. Products of the cluster are supplied to both domestic and international markets.

Figure 3.3 Northwest Russian Metal Cluster Chart



Currently, the main component of the cluster is metallurgy. It assumed this role as a result of structural changes during the Transition period of the Russian economy, which also led to a decline in the machine-building industry and triggered a sharp decrease in the domestic market. However, in the future, when formation of a new structure is complete, there exists a possibility for a reverse trend, whereby the metal-working sub-sector share will grow, as well as the share of final products with higher added value.

Despite the diversity of products manufactured by local metallurgy enterprises, only a small part can be referred to as final products. First of all, these are: pipes, wires, foils, pre-processed intermediary products for engineering, etc. The products now dominating Russian companies' sales are intermediary products: iron-ore pellets, primary metals.

The cluster's primary goods are dominated now by the metallurgy sector, which produces intermediary products competitive on the world market. At the same time, world leaders in metallurgy and metal working aim mainly at the manufacturing of final products with high added value – processed products for engineering.

Specialty inputs are the basic production factors in the cluster at present. The current ore-reserves situation in the region was described in the previous section of this paper. It should be added that for Severstal, the only full-cycle metallurgical complex in Northwest Russia, large deposits of coking coals in the Vorkuta area (Republic of Komi) are also of high importance.

The region is also characterized by a high concentration of educational and R&D institutions (with some of them serving as basic research centres in the corresponding industries). The main centre of education and R&D is St. Petersburg. The city of Cherepovets (in the Vologda region) also plays an important role, becoming more and more significant in the last years. Despite the decline in the last decade - loss of a qualified work force, decrease in R&D activities, high depreciation of research equipment, etc. – the sector still has significant education and R&D potentials.

However, one of competitive advantages lacking in the region is the availability of a specialised labour force. Today, the key factors are quality characteristics, such as educational standards, living priorities, mobility, corporate culture, etc. These changes resulted in lower competitiveness of Russia, and Northwest Russia in particular, on international markets. A generation gap, deterioration of both corporate culture and the social prestige of a job in metallurgy and metal-working industries, resulted in a substantial loss of personnel quality, which

nowadays limits the possibilities for development of the cluster and prevents companies from gaining a competitive edge in the medium-term outlook.

Equipment of the enterprises in the cluster is generally characterised by a high degree of wear and a low level of automation. Quite often, outdated technological processes are used. As is typical for many foreign companies, production facilities of Russian metallurgy enterprises are also under-utilised.

Presently, there are no competitive producers of equipment and machinery for primary goods manufacturers in Northwest Russia. There is therefore a real need for the renovation and modernisation of the established metallurgy and metal-working equipment, with local equipment manufacturers having an advantage in this field.

The main related industries of the cluster include energy and fuel supply, logistics, collection and pre-processing of scrap metal, and production of refractory materials. Metallurgy (especially, production of non-ferrous metals) is a highly power-intensive industry. The current relatively low tariff rates for electric energy and natural gas are one of the cluster's major competitive factors. Yet, in future, the tariffs will inevitably increase toward international levels, and the companies of the cluster will face an urgent need to reduce this cost. As of now, power and fuel used per unit of Russian metal products is much higher than that in developed countries, while companies' own power-generating facilities are clearly underdeveloped.

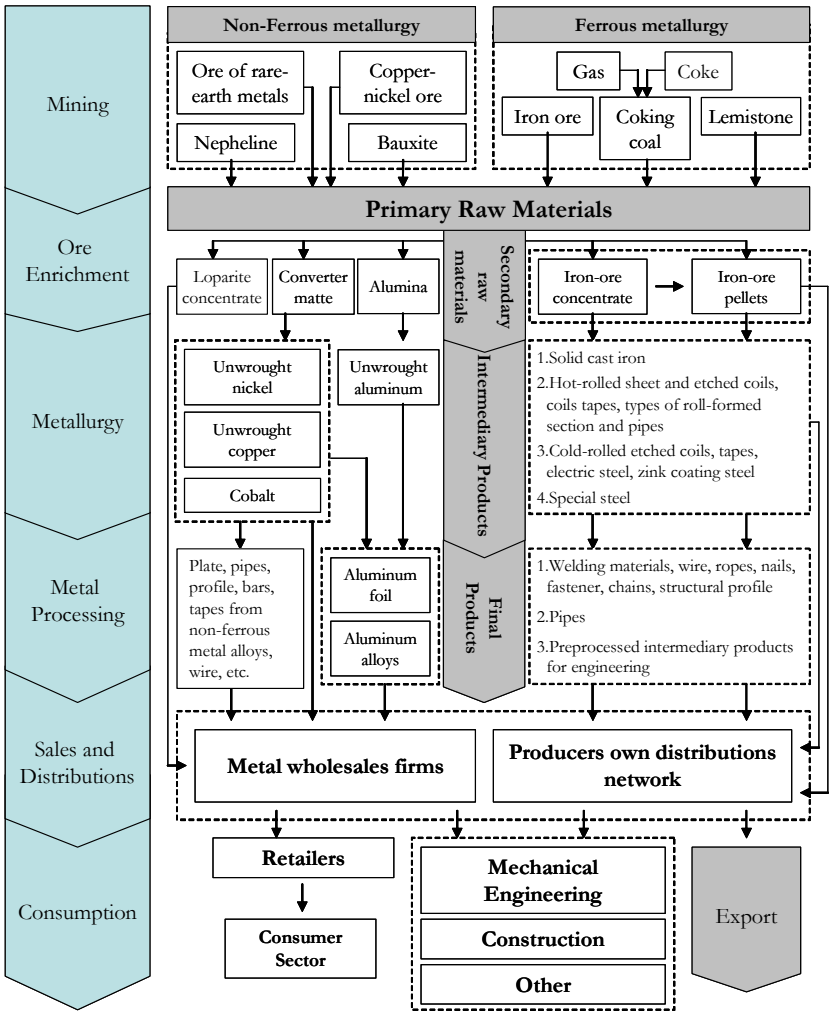
The problems of logistics are no less important for the cluster than problems of energy supply. The main bulk of cargo is transported over long distances by railway, which is fully owned by the State. The constant growth of railway tariffs over the last few years diminishes price advantages enjoyed by Russian enterprises, a fact which is aggravated by low quality of transportation and other logistics services. Still, there is virtually no alternative to railroad transport, since most enterprises are located far from seaports. Furthermore, throughput of the existing ports is insufficient due to huge amount of cargo coming to the Northwest from other regions of the country. Most projects currently debated for new seaports include construction of specialised seaport terminals for metal products.

Collection and pre-processing of scrap metals are at present mostly oriented toward export sales (even in spite of the recently imposed temporary ban on export of non-ferrous metals scrap), rather than toward satisfying the demand for secondary raw materials for Russian enterprises. It should also be noted that the volume of collected scrap

metal substantially decreased over the last decade, and the overall structure of this sub-sector changed significantly.

Among the associated services, environmental protection is becoming more and more important over the last few years. The metallurgy industry, along with the fuel and energy sectors, creates the greatest amount of industrial emissions of air, water and soil. Among the major cities, where the environmental situation is the worst, the cities with major metallurgy plants (Norilsk, Magnitogorsk, Cherepovets, etc.) top the list. However, there is no efficient system of environmental monitoring in place, because of the lack of adequate Russian legislation regulating environmental enforcement for industrial enterprises.

Figure 3.4 Flow Chart of the Metallurgy and Metal-working Cluster of Northwest Russia



Banking, finance, insurance and business consulting are only starting to play an important role in developing the cluster. One of the necessary conditions for modernisation is the ability of companies to ensure long-term credits. No less crucial is the establishment of an effective system of industrial insurance. Introduction of information technologies in all stages of management and technological processes, which is the distinctive feature of modern industrial organisation, is only starting in the cluster, too.

Only a small part of cluster output is consumed within the region, as a result of a sharp decrease in machine-building production in such industries as shipbuilding and, most of all, power engineering. However, these industries, as well as the construction industry, are still the main consumers of the cluster's products on the domestic market. The greatest part of the cluster's output is produced for export - on average, more than 50% of total sales and 70% or more of some product group sales.

At the end of this chapter, the structure of the metallurgy and metal-working cluster is represented in the form of a flow chart, which allows for vivid depiction of the cluster's cost chain.

In particular, it is clear from the above chart that ferrous and non-ferrous metallurgy and metal working are sub-sectors independent from each other. They are united only by the general similarity of their cost-creation chains and by their main customer, the machine-building industry.

3.4 Role of the Cluster in the Economy of Russia and Northwest Russia

Metallurgy, despite the fall in production volumes – in 2000, the production volumes in ferrous and non-ferrous metallurgy were 71% and 57.6%, respectively, of 1990 levels – remains one of the key industries of the Russian economy. According to the year 2000 results, metallurgy earned a 19% share in the total volume of domestic industrial production, and metallurgy companies' aggregate sales amounted to more than RUR 783 billion (about USD 27.8 billion).

Besides, the importance of the metallurgy industry for the country's economy stems from the fact that many metallurgy companies have actually formed towns nearby and bear substantial social costs (Norilsk, Cherepovets, Novokuznetsk, etc.).

There are a number of metallurgy agglomerations in Russia. The largest is located in the Urals – more than one third of the total metallurgy production in Russia. This is a result of historic events (transfer of industrial facilities from the European part of Russia to the Urals and Siberia during

Table 3.2 Russian Metallurgy in 2000

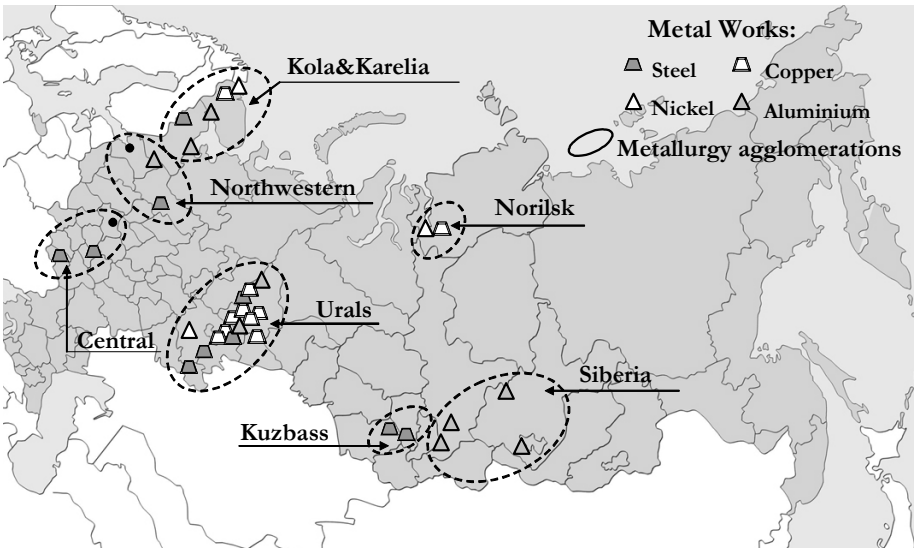
	Ferrous	Non-ferrous
Production, USD billion	13.1	14.8
Share in Total Russian Industrial Production, %	8.9	10.1
Employees, thousand	711	560
Share in Total Employed in the Economy, %	5.3	4.2
Exports, USD billion	6.7	8.3
Share in Total Russian Exports, %	14.9	18.5

Source: State Customs Committee, 2001, www.gks.ru, www.ampoc.ru

the Second World War) and the strategy of forming specialized regional industrial complexes during the Soviet period. According to this strategy, the Urals region was given the role of the main metal and machine-building (with especially high metal consumption) province of the USSR.

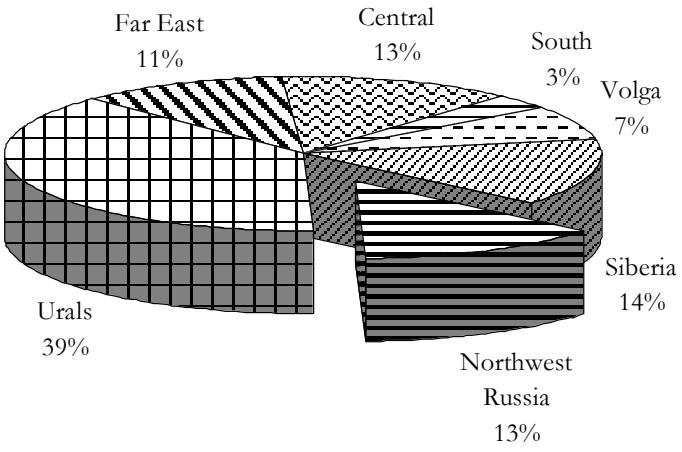
The Urals agglomeration produces virtually every kind of metallurgy product. Other agglomerations are more specialized in certain kinds of metals. There are two agglomerations in Northwest Russia: the Kola-and-Karelia and the Northwestern. The Kola-and-Karelia agglomeration specializes in iron-ore and non-ferrous-ores extraction and enrichment, as well as primary nickel, copper, aluminum and cobalt metallurgy. The Northwestern agglomeration specializes in casting iron and steel, and production of special steels, primary aluminum, and non-ferrous rolled metal.

Figure 3.5 Largest Metallurgy Agglomerations in Russia



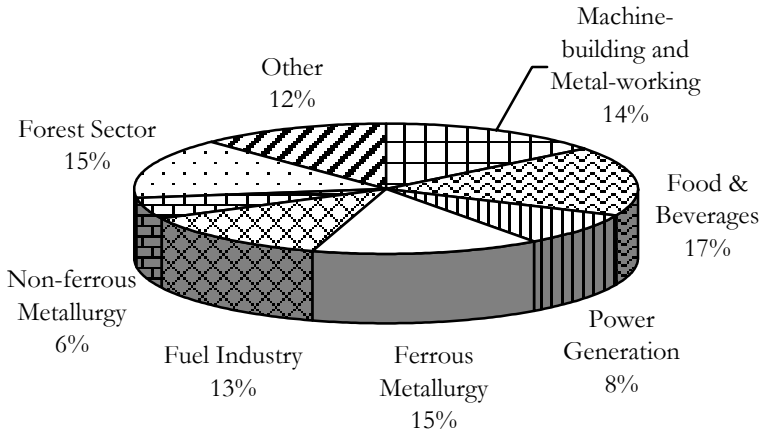
The enterprises of Northwest Russia provide 13.3% of Russia's total metallurgy production. Moreover, the region produces 100% of Russian nepheline concentrate and loparite concentrate (used for production of rare-earth metals), 50% of steel roll-formed sections, 35% of cold-rolled steel sheet and coated sheet, 22% of iron-ore pellets, and more than 20% of bauxites.

Figure 3.6 Regional Structure of Russian Metallurgy in 2000 by Federal District



Source: Goskomstat (Russian State Committee for Statistics), 2001

Figure 3.7 Structure of Industrial Production in Northwest Russia in 2000



Source: Goskomstat (Russian State Committee for Statistics), 2001

Metallurgy's share in Northwest Russia's total industrial production is 20.2%. At present, metallurgy, together with metal-working, is the largest industrial sector of the region. This position is dominated by ferrous metallurgy enterprises, which provide 14.7% of total industrial production in the region. Non-ferrous metallurgy comes in second place with its contribution of 5.5%. Such a disproportion is explained by the existence in Northwest Russia of a giant ferrous metallurgy plant (Severstal), while non-ferrous metallurgy is represented only by a number of relatively small enterprises.

The Vologda and Murmansk regions provide the largest share of metallurgy output in Northwest Russia. In the Vologda region, metallurgy companies provide about 66% of regional industrial production, while, in the Murmansk region, the metallurgy sector's share of regional industrial production amounts to 48.5%.

Apart from these two regions, metallurgy holds a substantial share, about 19%, in the industry of the Republic of Karelia. At major machine-building enterprises of St. Petersburg, metallurgy is closely connected with metal-working, which, as was described earlier, is accounted for together with machine-building (that is, separately from metallurgy) in Russian statistics. This, together with the sharp decline in machine-building production output in St. Petersburg, is the main reason for metallurgy's low share in the economy of St. Petersburg, as represented in the table 3.3.

Table 3.3 Northwest Russian Metallurgy by Regions

	Total Industrial Output in 2000, million USD	Share in Industrial Production, %	
		Ferrous Metallurgy	Non-ferrous Metallurgy
St. Petersburg	4,575	1.9	1.2
Vologda Region	3,239	65.6	0.3
Leningrad Region	1,958	0.2	8.3
Republic of Komi	1,804	-	0.1
Murmansk Region	1,710	10	38.5
Arkhangelsk Region	1,379	0.1	0.2
Republic of Karelia	875	13.6	5.2
Novgorod Region	668	5.5	0.1
Kaliningrad Region	528	1.4	0.7
Pskov Region	275	1.5	0.2

Source: Goskomstat (Russian State Committee for Statistics), 2001

There are prospects for a substantial increase in the share of non-ferrous metallurgy in the Republic of Komi, provided by the development of a major bauxite deposit already started in the region, as well as by the possible construction of an alumina-and-aluminum plant.

3.5 Current Cluster Development Macro-trends in the World

As a result of the closed economy of the USSR, metallurgy and metal-working companies did not take existing global trends into consideration when they planned their future development in the Soviet period. During the 1990s, the situation changed, and Russian enterprises started to work mostly for export, so now they have to consider the problems of the sector's development on a global scale. It is especially important in an open economy, where international macro-trends inevitably influence domestic markets. According to experts, the major macro-trends, which determine the development of the international metal cluster include the following:

1. Continuing growth of metal consumption in the world

The consumption growth rate has slowed down, compared to the period from 1960 through the 1980s, but growth itself continues. A substantial degree of substitution of metals by other types of construction and technological materials (primarily, plastics) is not expected in the near future.

2. Cyclical nature of metal products consumption

Together with the overall growth in metal consumption, there are marked stages of a more intense increase in consumption during periods of economic growth, and stages of recession during periods of economic crises. For instance, the Asian financial crisis of 1998 triggered an overall decline in metal consumption, primarily because of shrinking Asian-Pacific markets.

3. Growing diversification in metal products consumption

As a result of intense development in new high-tech industries (radio-electronics, vehicle manufacturing, aerospace technologies, etc.), consumers of metal products in developed countries demand newer and a greater variety of products.

4. Differentiated development of metal-products markets

Over the last few decades, in addition to the traditional markets of Western Europe and North America, major growth rates were seen in South-East Asia, which at present is the most significant market for products of

the Russian metallurgy industry. The Russian market, as well as the markets of the countries of the former Soviet Union and Eastern Europe, significantly shrank during the 1990s, and their present rates of growth are clearly insufficient to influence the overall situation in the world market of metal products.

5. Further mergers and acquisitions

The continuing assets-consolidation process is especially vivid in non-ferrous metallurgy. Thus, the company established after the merger of the two largest American aluminum producers (Alcoa and Reynolds) now controls over a third of the world's alumina output and over 20% of the world's primary aluminum production. The share of the company resulting from the merger of Alcan (Canada), Algroup (Switzerland) and Pechiney (France) in alumina and primary aluminum output is 16% and 15%, respectively. In Russia, this trend is supported by the development of two major holding companies, RusAl and Norilsk Nickel. In the sector of ferrous metallurgy, the trend to consolidate corporate structures is not as explicit, which can be explained by higher barriers for business penetration than in the case of non-ferrous metallurgy, as well as by a wider resource base.

6. Further labour division within the sector

Today's world market is characterized by a high degree of specialization by countries in particular types of products. More developed countries are striving to secure their positions in advanced technology products with a higher added value, while less developed countries are specializing in raw materials and products with a lower added value.

7. Development of technology

Ferrous metallurgy is characterized by the continuing decrease in blast-furnace steel production, and the corresponding increase in the output of electric-furnace and basic oxygen steel. In the sector of non-ferrous metallurgy, new developments are characterized by lower energy requirements. Both sectors pay more attention to stemming negative environmental impacts of their technological processes, not least by maximizing the use of scrap metal as their raw material (which is, in addition, more economically feasible).

8. Development of small metallurgy plants (mini-plants) that satisfy domestic needs for metal products, and their specialisation in specific market segments

The actual reason for this is the decrease in demand for large volumes of pig-metal, as a result of the completion of extensive industrialisation processes in developed countries, and the necessity to react quickly to changes in demand.

9. Existence of excessive production facilities belonging to industry leaders

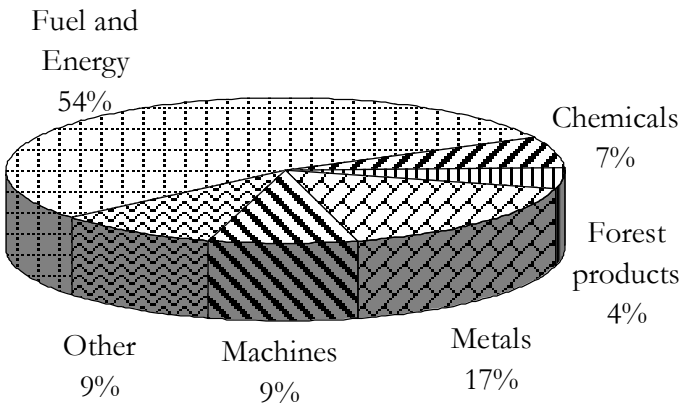
Excessive production capacities first emerged in the 1960 through the 1980s, when a rapid increase in demand for metal products resulted in the vigorous development of new and major modernisation of old production facilities. Subsequent decline in growth rates in demand led to under-utilisation of most leading producers, presently utilised at 50-70% on average. This allows the sector to increase output during economic booms without major average world-price fluctuations.

4 International Trade and Position in the World Market

Products of the metal cluster are the second most important Russian exports. In 2000, metals and metal products had a 17% share of total exports, while the industry's export volume in monetary terms amounted to USD 16.7 billion.

According to relative weight, non-ferrous metals and products composed 50% of exports, ferrous metals and their products – 41%, the rest was comprised of non-precious metals and products.

Figure 4.1 Russian Exports Structure in 2000



Source: State Customs Committee, 2001

In 2000, companies of the cluster exported about 59% of their total output on average. High export sales are characteristic for the majority of the sector's companies.

At the same time, despite the high share of export sales by companies in Northwest Russia, this export is not large in real terms, first of all, due to low production volumes. A notable exception is only Severstal, which is one of the biggest national exporters with total export sales in 2000 exceeding USD 1 billion.

Table 4.1 Share of Exports in Sales of Metallurgy Companies in Northwest Russia, 2001

	Products	Output, thousand tons	Export share, %
Karelski Okatysh	iron-ore pellets	6,708	≈30
Severstal	steel	9,547	53
	rolled metal	8,338	
Cherepovets Steel Rolling Mill	metal production	470	25
Severonikel	nickel	33.5	82
	copper	16.4	63
	cobalt	0.4	60
Krasny Vyborzhets	rolled non-ferrous metal	13.3	30
St. Petersburg Foil Plant	foil	10.4	25

Source: data provided by the companies

Export volume of non-ferrous metallurgy holdings having a part in the Northwest region is similarly large: Norilsk Nickel – over USD 2.2 billion, SUAL (Siberia-Urals Aluminum Company) – USD 0.5 billion. Exports of Northwest companies that are part of these holdings, however, are not large. For instance, the export volume of the Nadvoitsy Aluminum Plant (SUAL holding) totalled less than USD 80 million in 2000. Severonikel is also significantly behind the holding's main enterprise located in the city of Norilsk (North Siberia).

Table 4.2 Consumption Balance of Rolled Steel in Russia, Thousand Tons

	1998	1999	2000
Output volume	35,149	41,048	46,908
Export	23,025	26,840	26,504
Import	1,548	1,174	1,814
Domestic consumption	13,672	15,382	22,218
Domestic consumption/Output, %	38.9%	37.5%	47.4%

Source: Industrial Survey of Ferrous Metallurgy Enterprises, First Independent Rating Agency (2001)

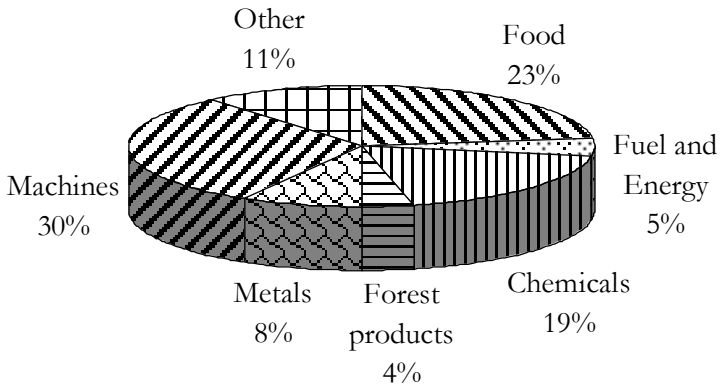
In 2000, the share of export sales of Russian metallurgy companies decreased by 12% compared to 1999. This reduction can be accounted

for by both a decline in metals export volumes and an increase in the domestic consumption of metals, mainly, of ferrous metals.

In recent years, due to antidumping measures undertaken by several countries, export of Russian metals has changed orientation and aims at other markets. While in 1998, the USA share in Russian rolled ferrous metals experts was the largest worldwide (about 30% of total sales), in 2000, the main buyers were already Asian countries (China, Turkey, Iran, Taiwan, Malaysia, etc.), and USA share declined three times.

Metal production is a significant import into Russia as well, occupying fourth place. In 2000, metal-products imports reached USD 2.5 billion, which was about 8% of total imports into the country.

Figure 4.2 Russian Imports Structure in 2000



Source: State Customs Committee, 2001

Box 4.1 Methodology for the Foreign Trade Analysis

For analysis of the clusters' positions on the foreign markets we use statistics of international trade of the countries, belonging to the Organization for Economic Co-operation and Development (OECD), with Russia. This approach is characterized by a number of advantages. First, OECD includes the most developed countries of the world, and thus its statistics allows analyzing positions of the Russian products on the most competitive and large segment of the global market. Moreover, detailed data of the ITCS (International Trade by Commodities Statistics) is available for the OECD countries, including more than 6,000 product groups (classified by HS – Harmonized System), which make possible detailed and comprehensive trade analysis.

We divide the analysis of the Russian foreign trade into two main parts:

- Study of competitive positions of the Russian products on the OECD markets (Russian exports analysis)
- Assessment of the import-substituting potential in Russia (Russian imports analysis)

1. Competitive positions of the Russian products

To assess the competitive edge of the Russian commodities on the OECD markets we estimate average share of the Russian exports in total OECD imports. It is considered that Russia has got competitive edge in those products where its exports share in OECD imports is over the Russian average share and trade balance is positive (separated by cut-off dotted lines in the tables below).

The analysis starts from the brief look on the shares of the Russian products on OECD markets by the most aggregated two digit groups. Here the main sectors where Russia got competitive edge are outlined.

№ HS	*Product Group*	*Russia's share in OECD imports*
Russian average		1.09%
05	Pr. Group 1	3.14%
84	Pr. Group 2	2.10%
34	Pr. Group 3	0.60%
67	Pr. Group 4	0.51%

On the next step we go deeper into classification of the product groups, sketching out competitive positions on the four-digit level.

№ HS	*Product Group*	*Russia's share in OECD imports*
Russian average		1.09%
0504	Pr. Group 1	5.56%
8416	Pr. Group 2	4.78%
5710	Pr. Group 3	1.56%
1905	Pr. Group 4	0.78%

On this level of classification we look also on the largest OECD markets and share of Russian products on them. This is aimed on assessing not only relative indicators of competitiveness, but also absolute figures of Russian exports.

№ HS	*Product Group*	*OECD market, million USD*	*Russia's share in OECD imports*
5603	Pr. Group 1	20,000	0.06%
1209	Pr. Group 2	15,000	0.15%
0504	Pr. Group 3	4,000	0.56%
3402	Pr. Group 4	2,500	0.43%

Finally the most detailed (six-digit) product groups, possessing larger than Russian average share on the OECD markets, are revealed. Analysis on this stage makes it possible to bring study on the level of certain products and corresponding companies, and thus to sketch not only competitive commodities, but also outline competitive manufacturers.

№ HS	*Product Group*	*Russia's share in OECD imports*
Russian average		1.09%
841610	Pr. Group 1	9.86%
500420	Pr. Group 2	5.13%
341790	Pr. Group 3	2.84%
232178	Pr. Group 4	0.89%

2. Import-substituting potential

The analysis of import-substituting potential starts from sketching out commodity groups with highest share of Russian imports in OECD exports. Those products, which have more than Russian average share, are considered as possessing relative import-substituting potential (separated by cut-off dotted lines in the table below).

№ HS	*Product Group*	*Russia's share in OECD exports*
Russian average		0.83%
45	Pr. Group 1	2.45%
08	Pr. Group 2	1.07%
24	Pr. Group 3	0.59%
1208	Pr. Group 1	6.87%
4503	Pr. Group 2	2.45%
0813	Pr. Group 3	0.26%

On the next step we focus on the volumes of Russian imports. We sort all 4-digit commodity groups by volume of imports into Russia. Product groups with large imports volumes are considered as possessing substantial possibilities for creating import-substituting production in Russia.

№ HS	*Product Group*	*Russian imports, million USD*	*Russia's share in OECD exports*
Russian average			
3414	Pr. Group 1	305	3.6%
4218	Pr. Group 2	287	2.5%
2911	Pr. Group 3	224	1.1%
4811	Pr. Group 4	208	3.2%

On the next step we go deeper into classification and apply similar procedure to 6-digit product groups. This helps to bring analysis on the level of certain products, which in turn could bring analysis to certain companies where revealed potential could be realized.

№ HS	*Product Group*	*Russian imports, million USD*	*Russia's share in OECD exports*
Russian average			
421835	Pr. Group 1	156	3.6%
341404	Pr. Group 2	123	2.5%
481102	Pr. Group 3	98	3.2%

Russian metallurgy's main product groups have a positive trade balance with OECD countries. The share of metals and metal-products exports is by far higher than the total share of Russian exports in OECD imports. In 1999, according to OECD statistics, the share of Russia in

Table 4.3 Competitiveness of Russian Metal Products on OECD Markets

		Share in OECD imports	**Exports from Russia, million USD**	**Total OECD imports, million USD**	**Trade balance, million USD**
2-digit level					
75	Nickel and articles.	13.5%	855	6,311	845
76	Aluminum and articles.	10.0%	4,872	48,586	4,714
81	Other base metals; cermets; articles.	6.2%	340	5,455	334
74	Copper and articles.	4.3%	1,154	26,946	1,120
72	Iron and steel.	4.1%	3,510	85,174	3,386
79	Zinc and articles.	2.4%	104	4,383	102
4-digit level					
7502	Unwrought nickel	23.0%	752	3,274	751
7601	Unwrought aluminum	22.2%	4,088	18,398	4,087
7201	Pig iron and spiegeleisen in pigs, blocks or other primary forms	20.2%	270	1,337	270
7207	Semi-finished products of iron or non-alloy steel	16.3%	706	4,324	706
7602	Aluminum waste and scrap	15.6%	457	2,924	457
7206	Iron and non-alloy steel in ingots or other primary forms	14.5%	11.4	78.5	11.4
7204	Ferrous waste and scrap, remelting scrap ingots or iron or steel	14.9%	805	5,416	804
8108	Titanium and articles thereof, including waste and scrap	11.9%	139	1,166	138
7503	Nickel waste and scrap	11.2%	23.1	207	15.3
7403	Refined copper and copper alloys, unwrought	10.6%	860	8,138	859

Source: OECD statistics (1999)

the import of metal products by member countries was 5.2%, while the share of total Russian exports in OECD countries was 1.09%.

As is clear from the table above, Russia's most competitive product groups are of low added value: unwrought metals, intermediary products and scrap.

In spite of their relatively large share in many commodity markets of OECD countries, in order to analyse the competitive power of Russian metals producers, it is necessary to evaluate their presence in the largest world markets.

Table 4.4 Largest Metal Product Markets and the Share of Russian Companies, HS, 4-Digit Level

		Total OECD imports, USD million	Share in OECD imports	Exports from Russia, USD million	Trade balance, USD million
7601	Unwrought aluminum	18,398	22.2%	4,089	4 088
7326	Articles of iron or steel	11,701	0.1%	7.4	-28.4
7210	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, clad, plated or coated	11,491	1.0%	113	85.7
7208	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, hot-rolled, not clad, plated or coated	11,267	4.6%	520	513
7318	Screws, bolts, nuts, coach screws, cotters, cotter-pins, washers and similar articles, of iron or steel	9,539	0.04%	3.9	-10.0
7606	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	8,681	1.8%	156	120
7403	Refined copper and copper alloys, unwrought	8,138	10.6%	860	859
7219	Flat-rolled products of stainless steel, of a width of 600 mm or more	7,975	0.03%	2.0	- 25.7
7308	Structures and parts of structures (for example roofs, doors and windows and their frames, shutters, etc), of iron or steel; angles, shapes, tubes and the like, prepared for use in structures, of iron or steel	7,153	0.2%	13.8	-74.4
7209	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, cold-rolled (cold-reduced), not clad, plated or coated	6,310	5.7%	361	359

Source: OECD statistics (1999)

As this table shows, in the OECD markets of high added value products (such as articles of iron or steel, flat-rolled products of stainless steel of a width of 600 mm or more, etc.), Russian companies have only a small share. The low competitive ability of Russian metal products with high added value results from the use of outdated technologies, especially in metal working, with poor accuracy and a narrow range of manufactured goods.

Most metal products imported to Russia come from the OECD countries. Therefore, it is interesting to analyse the structure of the goods delivered to Russia, as well as estimate the opportunities for import substitution.

Table 4.5 Potential of Import Substitution in Russia

		Russian imports, million USD	Share in OECD exports	OECD exports, million USD	Trade balance, million USD
7305	Tubes and pipes, the external diameter of which exceeds 406.4 mm	259	12.8%	2,020	-259
7308	Structures and parts of structures of iron or steel; rods, angles, shapes, etc	88.2	1.0%	9,269	-74.4
7607	Aluminum foil of a thickness (excluding any backing) not exceeding 0.2 mm	40.9	1.0%	4,136	-14.8
7304	Tubes, pipes and hollow profiles, seamless, of iron or steel	38.1	0.7%	5,391	-22.3
7606	Aluminum plates, sheets and strip, of a thickness exceeding 0.2mm	36.6	0.4%	9,839	119.5
7326	Other articles of iron or steel	35.8	0.3%	11,345	-28.4
7610	Aluminum structures and parts of structures; aluminum plates, prepared for use in structures, etc	31.6	1.1%	2,866	-30.1
7219	Flat-rolled products of stainless steel, of a width of 600 mm or more	27.7	0.3%	8,341	-25.7
7210	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, clad, plated or coated	27.6	0.2%	12,729	85.7
7604	Aluminum bars, rods and profiles	20.4	0.5%	3,919	38,682

Source: OECD statistics (1999)

As shown, most imports are products with high added value – tubes and pipes, structures and parts of structures of steel or aluminum, shapes, foil, etc.

Large diameter pipes, which account for a significant portion of all imports, were not produced in Russia during the Soviet period[1]. The

[1] The only plant to produce large-diameter pipes in the USSR was located in Ukraine.

predominance of other imported products with high added value is a consequence of the structural changes that took place in the last decade. Because of a sharp decline in domestic demand for machine-building enterprises, the metal-working sub-sector significantly reduced production volumes and stopped manufacturing a whole range of articles. As a result, a certain rise in the machine-building industry seen during the previous years has led to a deficiency in corresponding products, which is still mainly covered by import.

For a more detailed analysis of the import substitution potential, 6-digit level statistics have been used.

Table 4.6 Prospects for Import Substitution, HS, 6-Digit Level

		Share in OECD exports	Russian imports, million USD	OECD exports, million USD	Trade balance, million USD
730511	Pipe-line submerged arc welded steel diameter >406 mm	20.2%	257	1,276	-257
730890	Structures and parts of structures, iron or steel	0.9%	63.0	6,712	-56.1
732690	Articles, iron or steel	0.4%	32.4	9,151	-25.5
760720	Foil, aluminum, backed, not exceeding 0.2 mm thick excluding any backing	2.4%	29.2	1,244	-29.1
760612	Plate, sheet or strip, aluminum alloy, exceeding 0.2mm thick	0.3%	23.3	7,072	91.5
730420	Casings, tubing and drill pipe, for oil drilling	2.0%	22.9	1,169	-22.1
721070	Flat rolled iron or non-alloy steel, painted/plastic coated, width>600mm	0.9%	19.2	2,042	-18.6
761090	Aluminum structures and parts, for construction	0.9%	19.0	1,987	-17.6
740811	Wire of refined copper > 6mm wide	0.5%	13.4	2,591	-12.3
761690	Articles of aluminum	0.3%	12.9	4,441	-7.2

Source: OECD statistics (1999)

Thus, an import substitution potential is once more confirmed, especially for large diameter pipes and metal-working sub-sector products with high added value.

A relatively small negative trade balance for the majority of positions means there is an opportunity for import substitution by existing production facilities, provided they are modernised. At present, some en-

terprises (e.g. St. Petersburg Foil Plant) are already taking steps in that direction.

Today, there are several projects in Russia to organize a new, large, import-substituting facility manufacturing large-diameter pipes. In one of these projects Severstal was an active player.

Box 4.2 Large-diameter Pipes Production in Russia: To Be Or Not To Be?

At present, Russia finds itself in a rather paradoxical situation: while the combined length of the country's gas pipelines is one of the largest in the world, Russian enterprises have never been capable of producing pipes of the required diameter (primarily 1,420 mm). Large-diameter pipes (LDP) were purchased from Ukraine, Germany, Japan and Italy.

Because there is a real need in domestic production of LDP, a number alternative projects were under consideration during last years. The biggest were two:

1. **Alliance-1420 –** initiated by Severstal and United Metallurgy Company (OMK), which is one of the largest pipe producer in Russia. It was proposed to implement new manufacturing on the basis of Vyrsa Metallurgy Plant (located on Volga Region) owned by OMK and Izhora Pipe Plant (Leningrad Region) owned by Severstal. Planned production capacity of the project is 2.9 million tons of pipes with diameters ranging from 508 to 1,420 mm, of which 860,000 tons are 1,420-mm diameter pipes. Pipe length – up to 24 m.
2. **Production of LDP at Nizhny Tagil Metallurgy Plant** (NTMP – located in the Urals). This project was promoted by MDM Group, which operates the second largest pipe holding in Russia. One of the major advantages of this project was the geographical proximity to the main gas-producing region in West Siberia.

However, both projects have not started yet. The purpose in – Gasprom, which is the gas monopolist of Russia (including pipelines), is not transparent company. Its volumes of demand in LDP are not published and remain unclear. For example, Gasprom purchased in 2001 only 217,000 tons of LDP instead of more than 500,000 tons, as it was expected. That is why metallurgy companies cannot plan their future production volumes of LDP and, correspondingly, their costs and profit.

The situation certainly will change after demonopolization and restructuring of Gasprom. But these reforms will hardly start in the next few years.

5 Sub-sectors of Metallurgy and Metal Working in Northwest Russia

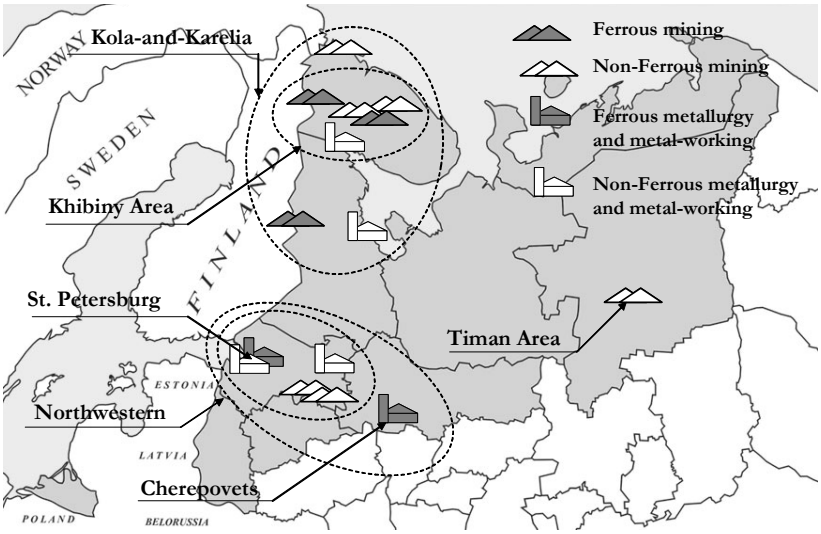
5.1 Cluster Sub-sectors and Their Agglomerations

Two main independent sub-sectors, producing different kinds of metal products, can be outlined in the metallurgy and metal-working cluster. They are:

- Ferrous metallurgy and metal working
- Non-ferrous metallurgy and metal working

Each of the sub-sectors plays an important role in the regional economy and a considerable share of the products of both sub-sectors is exported. There is no direct connection between the sub-sectors. All they have in common are some production technologies, similar infrastructure and the same pattern of interactions with related industries and services.

Figure 5.1 Northwest Russia Metallurgy and Metal-working Agglomerations



Presently, there are two major agglomerations of the largest metallurgy and metal-working companies in Northwest Russia: the Kola-and-Karelia and the Northwestern agglomerations.

The Kola-and-Karelia agglomeration is based on the ore deposits of the Kola-and-Karelia metallogenic province. The agglomeration unites a number of mining, enrichment and metallurgy enterprises of both subsectors:

- ferrous metallurgy – Kovdor GOK[2], Olenegorsk GOK and Karelski Okatysh (Kostomuksha GOK) supply enriched iron ore to Severstal (the city of Cherepovets), and part of it goes for export;
- non-ferrous metallurgy – Pechenganickel (copper-nickel ores mining and enrichment), Apatit (nepheline mining and enrichment), Severnye Redkiye Metally – Lovozero GOK (mining and enrichment of complex rare-earth metal ores), Severonickel (primary nickel, copper, cobalt manufacturing), Kandalaksha and Nadvoitsy Aluminum Plants (both – primary aluminum manufacturing).

The Kola-and-Karelia agglomeration uses low and medium-power hydroelectric stations and the Kola NPP, which supplies energy to the Khibiny mining and metallurgy area.

On the whole, the Kola-and-Karelia agglomeration manufactures products with low added value – enriched ores and primary metals**.** Extraction and enrichment play the main role in the agglomeration's activities, while the share of metal-working activities is close to zero.

The Northwestern agglomeration emerged as a result of the metallurgy and metal-working enterprises in St. Petersburg, which are oriented at manufacturing products with higher added value – alloys and a wide range of metal products for machine-building companies. However, the centre of this agglomeration has moved to Cherepovets – the primary metals produced by Severstal are more competitive on international markets.

Non-ferrous metallurgy in the Leningrad region is the most backward segment of the Northwestern agglomeration. It is represented by the Pikalevo and Boksitogorsk alumina plants and by Volkhov Aluminum (the oldest aluminum plant in Russia, with the lowest capacity) and has the smallest export potential.

In the future, a new agglomeration may form in the Republic of Komi, on the basis of the largest Russian bauxite deposits.

In terms of network economic geography, nowadays the largest centres of the cluster are Cherepovets, the Khibiny mining and metallurgy area, and St Petersburg. These centres are most of all involved in interactions of the regional metallurgy and metal-working cluster with global networks.

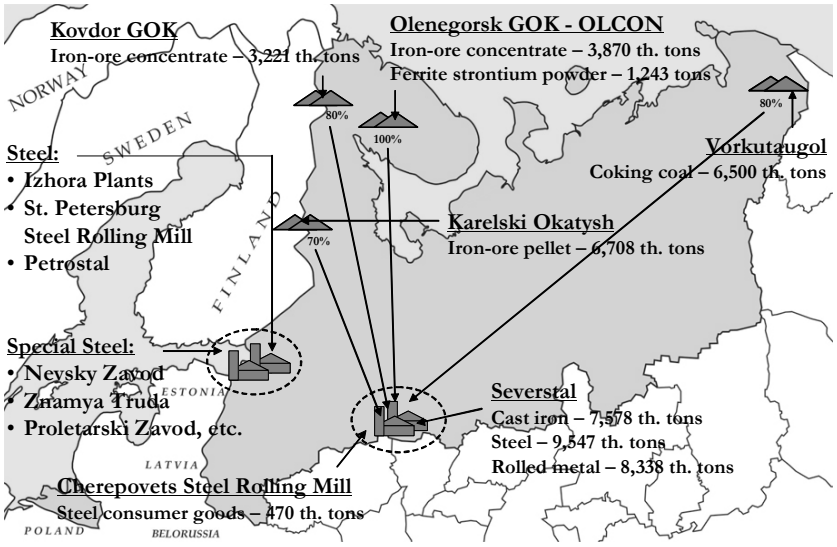
---

[2] GOK (Russian abbreviation) – mining-and-enrichment plant.

5.2 Ferrous Metallurgy and Metal-working

In 2001, ferrous metallurgy amounted to 16% of total sales volume of the 150 largest Northwest industrial enterprises, most of which was provided by the enterprises forming the Severstal holding (Severstal itself, Cherepovets Steel Rolling Mill, Karelski Okatysh, Olenegorsk GOK). About 74,900 people work at the five largest ferrous metallurgy included in the list of the 150 largest industrial companies of the Northwest region.

Figure 5.2 Ferrous Metallurgy and Metal Working in the Northwest Region, 2001



Source: data provided by the companies, 2000-2001

Ferrous metallurgy and metal-working in Northwest Russia is characterized by regional division of labour:

1. Mining enterprises are concentrated in the Murmansk Region and in the Republic of Karelia (Kovdor GOK, Olenegorsk GOK, Karelski Okatysh);
2. Severstal, which specializes in primary metallurgy, is located in the city of Cherepovets (Vologda Region);
3. St. Petersburg and Cherepovets are home to enterprises of secondary metallurgy and metal working (Petrostal, Izhora Plants, St. Petersburg and Cherepovets Steel-Rolling Mills, etc.).

Table 5.1 The Largest Ferrous Metallurgy and Metal-working Companies in Northwest Russia

	Region	Main metal products	Turnover, million USD, 2001	Em-ployees, 2001
Severstal	Vologda Region	Cast iron, steel, rolled steel	1,801	44,400
Cherepovets Steel Rolling Mill	Vologda Region	Steel products: nails, wires, chain, etc.	173	6,600
Izhora Plants	St. Petersburg	Steel, forged blanks, metal blocks for impact molding, sheets, plates, hot-rolled seam-less pipes, steel castings of various sizes and configurations	142	4,330
Karelski Okatysh	Republic of Karelia	Iron-ore pellets	137	8,300
Kovdor GOK	Murmansk Region	Iron-ore concentrate	134	6,000
Petrostal	St. Petersburg	Rolled sections of a wide range of carbon steels and alloy steel and special structural shapes	94	2,069
Olenegorsk GOK	Murmansk Region	Iron-ore concentrate, ferrite strontium powder	53	3,900
St. Petersburg Steel Rolling Mill	St. Petersburg	Cold-rolled band of precision alloys, low-carbon and carbon structural steels, alloyed, tool, and spring steel grades	n/a	1,500

Source: data provided by the companies

The largest metallurgy company in Northwest Russia is Severstal holding, which is also one of the three leading ferrous metallurgy companies in Russia. It holds about 17% of the Russian and about 1.2% of the world steel market. Severstal holding in the Northwest region comprises:

1. Severstal (Cherepovets Metallurgy Plant) – the holding's core enterprise – and Cherepovets Steel Rolling Mill – both enterprises are located in the Vologda Region, whose share in ferrous metallurgy production in Northwest Russia amounts to 79%;
2. Olenegorsk GOK (100% of its products are supplied to Severstal), Kovdor GOK (80% of its products are supplied to Severstal) –

both enterprises are located in the Murmansk Region; and Karelski Okatysh (70% of its products are supplied to Severstal) – which is located in the Republic of Karelia;

3. Vorkutaugol (the main supplier of coking coals) is located in the Republic of Komi.

Severstal is the 11th largest Russian exporter and the country's largest exporter in the ferrous metallurgy sector. The company carries out the full metallurgy cycle and produces coke, cast iron, steel (converter steel, electric steel), rolled metal (hot-rolled sheet – 42.1% of sales, cold-rolled sheet – 36.3%, rolled bars – 11.2%). The company's capacities include the coke department (6 million tons a year), cast iron department (about 10 million tons a year), steel department (about 13 million tons per year) and rolling department (peak capacity 12 million tons a year).

Cherepovets Steel Rolling Mill is the largest Russian manufacturer of steel products. The mill produces welding materials, steel wire, cables, mesh, nails, small ironware, reinforcing steel, calibrating steel, chains, steel shapes. In 2001, approximately 30% of its production was exported.

Olenegorsk GOK (Olcon) produces iron-ore concentrate (capacity is about 6 million tons), ferrite strontium powders, crushed stone (1.9 million m^3 in 2000). Currently, more than 99% of Olcon's products is supplied to Severstal.

Prospects for the enterprise's development are vague. At the current mining volumes, ore resources for active open mining will be totally exhausted in the next 7 to 8 years, with conversion to underground mining economically inefficient, due to the method's high costs. For the main shareholder of the enterprise, Severstal, it is much more profitable to use iron ores of the Kursk iron-ore province, which are better and easily accessible. So, most probably, Olenegorsk GOK will be partially closed down temporarily.

Karelski Okatysh (Kostomuksha GOK) is Northwest Russia's largest producer of iron ore. Production capacity of the enterprise amounts to: in ore mining – 24 million tons per year, in concentrate production – 9.3 million tons per year, in pellets production – 9 million tons per year. The main product is iron-ore pellets.

Two thirds of the enterprise's output is supplied to the domestic market, where the largest consumer is Severstal, whose share in total sales volume is 70%. Another large domestic consumer of the enterprise's production had traditionally been Mechel (Chelyabinsk Metallurgy Plant, in the Urals) but, after Karelski Okatysh came under the control of Severstal, deliveries to Mechel were stopped.

About one third of the enterprise's output is exported, through the port of Vysotsk in the Leningrad region and by railway to Finland. Karelski Okatysh produced 25% of the total volume of pellets made by Russian enterprises in 2000, and 32% of the volume of pellets exported by Russian producers far abroad.

Karelsky Okatysh's foreign consumers include: Rautaruukki Group (Finland) – about 33% of all exports (in 2001, about 150,000 tons of pellets was supplied to the Fundia plant in Finland, a subsidiary of Rautaruukki Group); EKO-Stahl (Germany) – about 10% of exports; Dunaferr (Hungary); VSMK (Slovakia); Huta Stettin (Poland), Erdemir (Turkey), Kos-Scan (Norway).

At present, the holding of Severstal is developing by diversifying itsproduction, as well as by cooperating with other companies. Severstal has purchased control stock of the Ulyanovsk Automobile Plant and Zavolzhsk Motor Plant (both located in the Volga region), as well as established, jointly with the Riga Railway Carriage Plant (Latvia), a joint-stock company, SeverstalLat, aiming to enlarge the market for its production. In order to increase logistics efficiency, it has also become an affiliated association of Severstaltrans. Exports of Severstal's chemical facility products (fertilizers, etc.) will be carried out through its own chemical terminal in the port of Ust-Luga, whose construction is now being completed in the Leningrad Region.

Among the primary ferrous metallurgy enterprises that are not part of Severstal, the largest is Kovdor GOK.

Kovdor GOK is, at present, owned by MDM Group, but has a long-term delivery contract with Severstal. Its annually capacity is about 5.5 million tons of iron-ore concentrate with Fe content 65%. The enterprise is one of the key suppliers of iron-ore concentrates to Severstal (2.8 to 3.0 million tons per year, which amounts to 80% of the total production volume). Besides that, Kovdor GOK is engaged in apatite-concentrate extraction (the main consumers are Fosforit (Kingisepp in the Leningrad Region), Kemira (Finland), Hoechst (Germany), Norsk Hydro (Norway); export volume in 2001 amounted to 1 million tons) as well as badelleite-concentrate production, demand for which exceeds the current production volume.

St. Petersburg is the second largest ferrous metallurgy centre in the Northwestern agglomeration. A high level of integration with machine building contributed to manufacturing final products – special alloyed steels, pre-processed intermediary products for engineering, etc. The main producers are Izhora Plants, Petrostal, St. Petersburg Steel Rolling Mill, Znamya Truda, Proletarsky Zavod, and others.

Izhora Plants is one of Russia's largest machine-building and metal-working facilities and is part of the largest Russian machine-building corporation – United Machine-Building Plants (OMZ).

Izhora Plants is a vertically-integrated diversified enterprise comprising metallurgy facilities (steel melting, press forging, rolling and thermal departments), as well as facilities for pipe manufacturing, moulding, welding, assembly, metal processing, power engineering production and maintenance.

The company mostly specializes in the manufacture of equipment for the mining and fuel industries (oil rigs, pipe fittings, etc.) and for the electric power industry (nuclear power plant equipment), but about 30% of its revenues are provided by metallurgy products (in 2001, the enterprise produced 164,000 tons of steel). Most consumers are from Russia and countries of the former Soviet Union. The total share of exports in company sales is about 30%.

At present, the company is restructuring its activities, and is planning to sell or spin off some non-core businesses. For example, in 2000, the company sold its Rolling Mill-5000, built during the Soviet period to supply wide steel sheets for nuclear power plants, to Severstal.

Petrostal is a subsidiary company of the Kirov Plant, the biggest machine-building holding in Northwest Russia.

The main products of the company include carbon and alloyed steel, as well as specialized steel shapes and section. The company is also capable of producing small batches of rolled products by special orders. The enterprise operates pile-driving, open-hearth-furnace (annual output of 300,000 tons of steel), rolling-mill (annual output of 490,000 tons), and oxygen-production facilities. In 2001, the enterprise produced 310,000 tons of steel at 100% utilization of production capacity.

Most of the enterprise's output is supplied to the domestic market, where its main consumers are the biggest Russian automotive manufacturers: AutoVAZ, KAMAZ, ZIL, GAZ. Export sales account for about 40% of total production output.

In 2001, Petrostal launched a major plan of modernisation, including construction of a non-furnace liquid-steel processing facility, a continuous moulding facility, as well as replacement of open-hearth furnaces with electric furnaces. The total cost of this plan is estimated at USD 50 million.

The common problems faced by all metallurgy companies in St. Petersburg include low domestic demand for products with a high

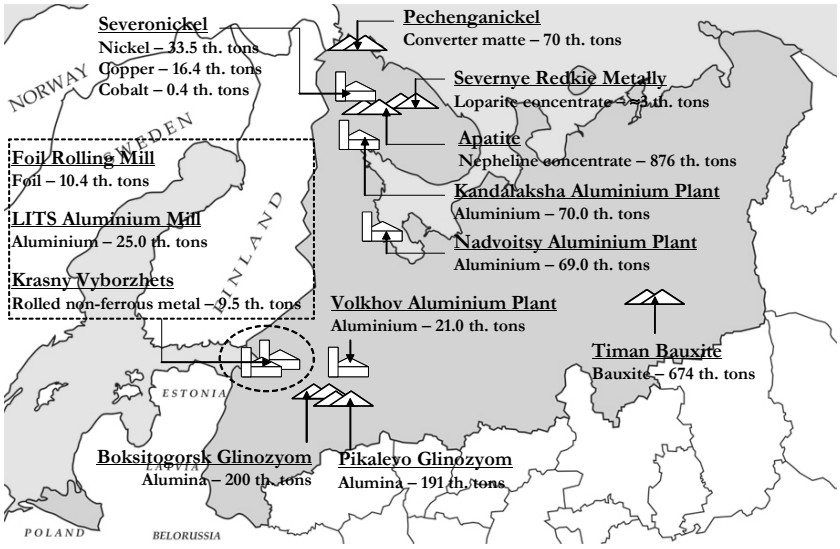
added value (which was the main type of product produced during the Soviet period), outdated equipment, and a marked generation gap in the workforce, which results in a major deficiency of qualified personnel. The main reason behind all these problems is the continuing recession in major metal-consuming industries: the military complex and the machine-building sector.

5.3 Non-ferrous Metallurgy and Metal-working

Non-ferrous metallurgy accounts for 5.3% of aggregate revenues of the top 150 industrial enterprises of Northwest Russia in the year 2001. Total workforce at the 9 non-ferrous metallurgy companies included in the top 150 largest companies of Northwest Russia amounts to 32,200 people.

The structure of non-ferrous metallurgy in Northwest Russia is determined by the location of its ore deposits and power plants. The Murmansk region is the largest non-ferrous metallurgy centre in the Northwest region. A considerable number of non-ferrous ore deposits are concentrated there. Pechenganickel (which produces copper and nickel converter matte) and Severonickel (which produces copper, nickel and cobalt) metallurgy plants were constructed on the basis of copper-nickel

Figure 5.3 Structure of the Non-ferrous Metallurgy and Metal-working in Northwest Russia



Source: data provided by the companies, 2000-2001

Table 5.2 The Largest Non-ferrous Metallurgy and Metal-working Companies in Northwest Russia

	Region	Main metal products	Turnover, million USD, 2001	Employees, 2001
Apatit	Murmansk Region	Apatite and nepheline concentrates	339	14,600
Pikalevo Glinozyom	Leningrad Region	Alumina	73.1	4,800
Kandalaksha Aluminum Plant	Murmansk Region	Aluminum	58.7*	1,400
Severonickel	Murmansk Region	Nickel, copper, cobalt	65.0**	13,000
Pechenganickel	Murmansk Region	Converter matte	53.0**	10,000
Boksitogorsk Glinozyom	Leningrad Region	Alumina	39.5	3,447
Nadvoitsy Aluminum Plant	Republic of Karelia	Aluminum	55.2	2,000
Krasny Vyborzhets	St. Petersburg	Rolled non-ferrous metals	31.9	1,500
LITS Aluminum Plant	St. Petersburg	Aluminum	20.3	300
Severnye Redkiye Metally	Murmansk Region	Loparite concentrate	10.4**	1,800
Foil-Rolling Mill	St. Petersburg	Foil	6.5	1,150
Timan Bauxite	Republic of Komi	Bauxites	3.0*	113
Volkhov Aluminum	Leningrad Region	Aluminum	n/a	1,417

Notes: * Data for 2000, ** Data for 1999
Source: data provided by the companies

ore deposits and are currently a part of the holding Norilsk Nickel. Apart from that, the ore deposits of the Kola Peninsula provide raw materials for the Apatit and Severnye Redkiye Metally companies, which produce nepheline and loparite concentrates, respectively. On the whole, there are 13 large non-ferrous metallurgy companies operating in the region.

Northwest Russia clearly displays the national trend toward vertical integration of non-ferrous metallurgy companies. For instance, Severonickel and Pechenganickel are owned by Norilsk Nickel. Kandalaksha

and Nadvoitsy Aluminum Plants, as well as the mining company Timan Bauxite, are controlled by SUAL Holding. The merger of Volkhov Aluminum, controlled by the British company Aimet International Ltd. (with Russian capital), and its major supplier of alumina, Pikalevo Glinozyom, led to the establishment of Metallurg holding, which is now the third biggest vertically integrated non-ferrous metals producer in Northwest Russia after Norilsk Nickel and SUAL.

All non-ferrous metallurgy enterprises in Northwest Russia can be divided into two major types: aluminum producers and copper-nickel producers. A special position is held by Severnye Redkiye Metally, which specialises in extraction and processing of rare-earth metals.

Copper and nickel production in the region is represented by subsidiaries of the biggest metallurgy holding in Russia, Norilsk Nickel.

Norilsk Nickel is the largest non-ferrous metal producer, controlling about 20% of total world nickel production, 10% of cobalt and 3% of copper production. It is also the world's largest producer and seller of platinoids. The holding produces 96% of Russian nickel, 55% of copper and 95% of cobalt. The company provides 3% of total Russian industrial output. Raw materials base consists of the deposits of Norilsk (containing 85% of Russian nickel reserves) and the Kola peninsula (with 10% of reserves).

The Kola Mining and Metallurgy Company (KGMK), which is the second largest Norilsk Nickel operating department, is located in the Murmansk region. Pechenganickel (which produces copper and nickel converter matte) and Severonickel (which produces nickel, copper and cobalt) metallurgy plants are currently integrated into KGMK.

Severonickel is located in the town of Monchegorsk (in the Murmansk region) and specialises mainly in the production of nickel. In 2000, about two thirds of total output volume was nickel, while the remaining one third was copper. Currently, cobalt's share in total output volume does not exceed 1%. About 60% of raw materials is supplied by the Pechenganickel enterprise, which is also a part of KGMK. The remaining 40% is delivered to Severonickel from Norilsk.

The plant produces electrolytic nickel, nickel carbonyl powder, electrolytic copper, concentrates of precious metals, sulphuric acid, etc. About three quarters of the total output is exported, including more than four fifths of the produced nickel and about two thirds of the produced copper.

Conforming with Norilsk Nickel strategy, Severonickel is currently modernising its production facilities (transfer to chlorination-refining

technology) and changing its specialisation to the predominant production of cobalt.

Pechenganickel specialises in converter-matte production, as well as production of sulphuric acid. Most of the plant's output is supplied to the adjacent Severonickel plant, which is also a part of KGMK. The plant is comprised of four pits, an enrichment mill, melting and sulphuric-acid shops, motor transport, rail transport, and other departments.

Production costs of copper and nickel in the Kola Peninsula are much higher than in Norilsk. The pits have been depleted, and ore is extracted mostly by underground mining.

In 1999, Kola GMK, together with the Gipronickel research institute, developed a USD 300 million project for company development, with USD 200 million allocated for the development of the raw materials base. As an analysis of the Kola Peninsula raw materials base has shown, apart from copper-nickel ores, which are the company's core raw materials, it is also possible for the company to extract and process non-ferrous and precious metals that are not traditional for the enterprise, such as chromium, titanium and platinum. In August 2001, Pechenganickel started the construction of a new central pit, planned to be put in operation in 2005, which will extend the enterprise's operation by at least 50 years.

The plant's enrichment mill is also undergoing a modernisation, in order to increase metal content in the produced concentrate.

A Russian-Norwegian governmental agreement on reconstruction of the metallurgy facilities at Pechenganickel was signed in June 2001. It will receive financing in the amount of USD 100 million, of which USD 40 million will be provided by Norilsk Nickel, and USD 60 million will be invested by the government of Norway and Nordic Investment Bank.

While primary copper-nickel metallurgy in the Northwest region is concentrated in the Kola Peninsula, the largest manufacturers of final non-ferrous products are located in St. Petersburg. The key role belongs to Krasny Vyborzhets.

Krasny Vyborzhets, controlled by Interros, produces about 10% of Russian non-ferrous rolled metal. The enterprise manufactures copper ingots, as well as rolled copper, brass, bronze, and copper-nickel alloys. The plant's production is used in electronics, electrical engineering, shipbuilding, etc.

In 2001, the output volume amounted to about 9,500 tons, while the planned production capacity of the plant is 36,000 tons. In 2000, exports

took a 10% share. The main overseas consumers are Engelhard Metals Limited and Unimet AG.

In July 2002, after a period of modernisation, the vacuum department was reopened for the production of heat-resistant alloys, used in the manufacturing of military-space equipment. Additionally, the enterprise plans to put a new horizontal hydraulic press into operation, which will significantly increase the range of rounds produced, as well as improve quality.

Despite this, the plant is still experiencing an extremely hard financial situation. The main owner of the enterprise (Interros owns 78% of the plant's shares, but these shares have been transferred from asset management to the managers of the enterprise) is considering sale of the plant either to its management, or to an exterior strategic investor.

The largest aluminum producers in Northwest Russia are the following:

- Ore extraction and enrichment: Pikalevo Glinozyom, Boksitogorsk Glinozyom, Apatit, Timan Bauxite;
- Primary aluminum metallurgy: Kandalaksha Aluminum Plant, Nadvoitsy Aluminum Plant, Volkhov Aluminum;
- Secondary aluminum metallurgy and metal working: St. Petersburg Foil-Rolling Mill, LITS.

Geographically, the companies are grouped within two large aluminum agglomerations: the Kola-and-Karelia and the Northwestern. The Kola-and-Karelia agglomeration is comprised of the Kandalaksha and Nadvoitsy aluminum plants, as well as the mining company Apatit.

Kandalaksha Aluminum Plant is located in the south of the Murmansk region, in the town of Kandalaksha. The plant produces primary aluminum in pigs and ingots, and aluminum rods, which are used for the production of wire. Aluminum production is carried out at the plant by cryolite-alumina fused electrolysis. In 2000, aluminum-production volume reached 70,000 tons.

In 2000, the enterprise became part of SUAL Holding. Within this holding, it receives alumina and anodic mass from the Bogoslovsk Aluminum Plant, and cryolite and aluminum fluoride from the Polevo Cryolite Plant (both in the Urals).

Nadvoitsy Aluminum Plant is located in the Nadvoitsy town in the Republic of Karelia. The plant's planned production capacity is 70,000 tons of aluminum per year. The products are aluminum in pigs, silumin, pow-

der, and doughs of aluminum and its alloys of various degrees of purity and dispersion.

In June 2001, 37% of the plant's shares were purchased by SUAL Holding, which resulted in the plant's exclusive use of alumina produced by other enterprises in the holding. Boksitogorsk Glinozyom (60% of whose shares are controlled by entities linked to the Nadvoitsy Aluminum Plant) delivers half of the required alumina volume. At present, the plant is operating at 100% production. In 2000, it produced more than 69,000 tons of primary aluminum.

The plant's largest investment project led to the launch in 1999 of an electrolysis production line, using the technology developed by Kaiser (USA).

The Northwestern agglomeration is the second largest centre of aluminum metallurgy and metal working in Northwest Russia. There are a number of companies aimed at aluminum production, owing to deposits of bauxites as well as energy facilities (the Leningrad Nuclear Power Plant, the Volkhov Hydroelectric Power Plant). The largest companies in the region are Pikalevo Glinozyom – producing alumina, and Volkhov Aluminum – specialising in primary aluminum production. Both companies are controlled by Aimet (UK). The second largest alumina producer in the region is Boksitogorsk Glinozyom, based on the Tikhvin bauxite deposit.

The two largest alumina producers in Northwest Russia, Boksitogorsk Glinozyom and Pikalevo Glinozyom, together produce about 17% of all Russian alumina.

Pikalevo Glinozyom is located in the town of Pikalevo (in the Leningrad Region) and produces alumina out of nepheline concentrate from the company Apatit (in the Murmansk region), as well as a number of secondary products, including soda and cement.

Most of the output is meant for further processing at the Nadvoitsy and Kandalaksha aluminum plants, with a significant part going to adjacent Volkhov Aluminum.

In 1997, Aimet International Ltd. became the plant's largest shareholder. In October 2001, Pikalevo Glinozyom was consolidated with Volkhov Aluminum into a new production merger, Metallurg, within a unified holding.

Boksitogorsk Glinozyom is located in the town of Boksitogorsk in the Leningrad region. At present, the enterprise is owned by a group of shareholders, the largest of which is the Nadvoitsy Aluminum Plant. The

plant produces alumina of various grades, aluminum hydroxide, gallium, bauxite, white electro-corundum materials, grinding dusts, and materials for the refractory industry.

At present, the bauxite pits of the Tikhvin deposit, which are the main source of raw materials for the plant, are almost completely depleted, and further development is aimed at the search for new raw materials sources. One of the options being considered is the purchase of Timan bauxites deposits in the Republic of Komi. However, negotiations with the SUAL holding, the owner of the Timan deposits, have so far not been successful.

The Republic of Komi, which currently plays almost no role in non-ferrous metallurgy in the Northwest region, is likely to become one of its production centres in the future. Exploitation of the largest Russian bauxite deposits has been already started by the Timan Bauxite Company (controlled by SUAL). Furthermore, a large new alumina-and-aluminum plant is currently under consideration for construction (see Box 3.2).

Two other companies important in this segment are the St. Petersburg Foil-Rolling Mill, one of the largest foil producers in Russia, and the LITS aluminum plant, which is involved in manufacturing of aluminum alloys.

Apart from copper-nickel and aluminum-producing enterprises, non-ferrous metallurgy in Northwest Russia specialises in the extraction and enrichment of rare-earth metal ores, the core activity of Severnye Redkiye Metally.

Severnye Redkiye Metally (SevRedMet) is located in the town of Revda (in the Murmansk region) and, at present, is the only Russian producer of rare and rare-earth metals concentrate, as well as their compounds. 80% of Soviet niobium, 50% of tantalum, and 75% of rare-earth metals were produced from Kola loparite concentrate. However, during the period of reforms, domestic consumption of the plant's production sharply declined, which resulted in its facilities now only operating at 10%. At present, several large financial and industrial groups are struggling for ownership of the enterprise.

In the world market, SevRedMet's products are not competitive compared to the price of Chinese products. At present, loparite concentrate is delivered for further processing to the Solikamsk Magnesium Plant (in the Perm region) and the AS Silmet enterprise (in Estonia). Construction of the plant's own facilities for extensive processing of loparite concentrate still has not found investors – the estimated minimal investment would be about USD 100 million.

5.4 Metallurgy Equipment Manufacture

The machine-building industry in Northwest Russia, on the whole, does not specialise in the manufacture of equipment for the metallurgy and metal-working industries. Still, there are a number of manufacturers of equipment for the cluster's enterprises, the most important of which is Izhora Plants in St. Petersburg.

Table 5.3 The Largest Metallurgy Equipment Manufacturers in Northwest Russia

	Region	Equipment	Turnover, million USD
Izhora Plants	St. Petersburg	Rolling mills, hydraulic testing equipment, conveyor agglomeration machines, blast-furnace equipment, continuous casting machines, forge-and-press equipment, mining excavators, crush mills	21.5* (2001)
Nevsky Plant	St. Petersburg	Compressors, turbines (gas and steam)	7.9 ** (2000)
Mekhanobr Plant	St. Petersburg	Enrichment and crushing-and-sorting machines, scrap-metal processing equipment, sintering and pelletising machines	1.3 ** (2000)
Kaliningrad Railway Carriage Plant	Kaliningrad Region	Dump wagons and dump cars, electric loaders, containers for various cargos	n/a
Caterpillar-Tosno	Leningrad Region	Mining and transportation equipment	n/a

Notes: * metallurgy equipment only; ** total revenues
Source: data provided by the companies

In the 1990s, the number and volume of orders from Russian mining and metallurgy enterprises significantly declined. Therefore, in order to preserve personnel and maintain production facilities, machine-building enterprises were forced to shift production to other types. Naturally, there have not been any innovations in the core production, so as a result, the mining and metallurgical equipment technological lag from world standards, which existed even earlier, has increased even more over the last decade.

Growth in production volumes in the metallurgy industry, which followed the financial crisis of 1998, led to an increase in the number of orders for new equipment, but the machine-building companies of the region were often unable to fulfil the orders. Russian equipment manufacturers are clearly inferior to their Western competitors in terms of their technological capabilities. The level of productivity in the sector is 2 to 3 times lower than in advanced countries, while R&D expenses are 6 to 8 times lower (moreover, their absolute volumes are simply beyond comparison).

As a result, the biggest Russian metallurgy companies, such as Severstal, the Novolipetsk Metallurgy Plant and the Magnitogorsk Metallurgy Plant, have recently been purchasing most of their new equipment abroad.

At the same time, the leading Russian equipment manufacturers, which had already introduced quality control systems and widened the range of their products, have, over the last few years, increased their sales. The obvious leader in the Russian market of metallurgy equipment is Izhora Plants, part of the holding United Machine-Building Plants (OMZ), which is comprised of a number of machine-building enterprises in the Urals region and in Northwest Russia. The OMZ company produces a wide range of metallurgy equipment and controls about 70% of the Russian market in continuous casting equipment, 50% of rolling mills, and 40% of rolls. On the whole, the company's share of the Russian metallurgy-equipment market is estimated at over 50%.

The main Russian consumers of equipment produced by Izhora Plants are Severstal, the Kuznetsk Metallurgy Plant, the Novolipetsk Metallurgy Plant, Nosta (the Orsko-Khalilovsky Metallurgy Plant), Lebedinsky GOK, and Mikhailovsky GOK. Izhora Plants also participates in the manufacturing of continuous casting equipment for the Magnitogorsk and Nizhny Tagil metallurgy plants.

Izhora Plants also exports metallurgy equipment to Bulgaria (Kremnikovtsy), India (Bocaro, Rourkela), Iran (Esphahan Steel Company), Macedonia (AD Macsteel), Pakistan (Paksteel), Poland (Huta Sigmund, Huta Weildon), Czech Republic (Trinetsky Metallurgy Plant), Kazakhstan (Ispat-Karmet), Syria (MESI).

However, even in the case of Izhora Plants, the quality of production is lower than that of world leaders. That is why the holding's attempts to export their equipment to advanced markets failed. At present, OMZ holding's share in the world market of metallurgy equipment is only about 0.5%. In addition to the technological lag, another major factor is the absence of a targeted strategy: the holding tries to export equipment

with a wide range of technologies, including blast-furnaces, agglomeration and rolling-mill equipment, as well as hydraulic presses, while its major foreign competitors prefer a more specialised approach.

A characteristic trend in the industry is a gradual growth in quality expectations on part of Russian consumers. A large portion of the metals sent for export requires higher quality equipment on the part of metallurgy enterprises, which have enjoyed profits over the last few years that enable them to purchase equipment from leading world manufacturers. Consequently, OMZ share in the domestic market of metallurgy equipment fell from 78% in 1999 to 55% in 2001.

OMZ holding also enjoys almost a full monopoly in the domestic market of mining equipment (95%). The overall demand for bucket excavators, Izhora Plants' main product, is gradually decreasing but, in northern Russia's conditions, such equipment is clearly superior to the more efficient, but less durable, hydraulic machines.

The Caterpillar-Tosno plant became another major mining-equipment producer in Northwest Russia in 2000. It assembles Caterpillar excavators, loaders, tractors and other equipment. Still, the range of products of Caterpillar-Tosno and that of Izhora Plants does not overlap, so they do not compete in any market segment.

Among other manufacturers of metallurgy and mining equipment in Northwest Russia are the Mekhanobr Plant and the Tractor Plant. The latter, a part of the Kirov Plant holding company, has launched production of drilling rigs and mining equipment. However, the quality of these products is inferior to that of western analogues, and its main advantage is lower price. Equipment produced by the Mekhanobr Plant and the Traktor Plant is supplied to Norilsk Nickel, Apatit, Karelsky Okatysh, Gaisky, Uchalinsky, and Lebedinsky GOKs.

Revenues of metallurgy-equipment producers are, on the whole, rather low (Izhora Plants being an exception). This prevents significant investment, especially necessary for modernisation of production facilities. It should be noted that in order to raise investment potential, even such strategic measures as the use of international accounting standards and the listing of company shares on stock exchanges, cannot bring immediate positive results. In the current Russian environment, companies suffer from a general negative investment climate, on both national and regional levels. Therefore, only an effective governmental investment policy will bring visible results to the companies.

5.5 Related Industries and Services

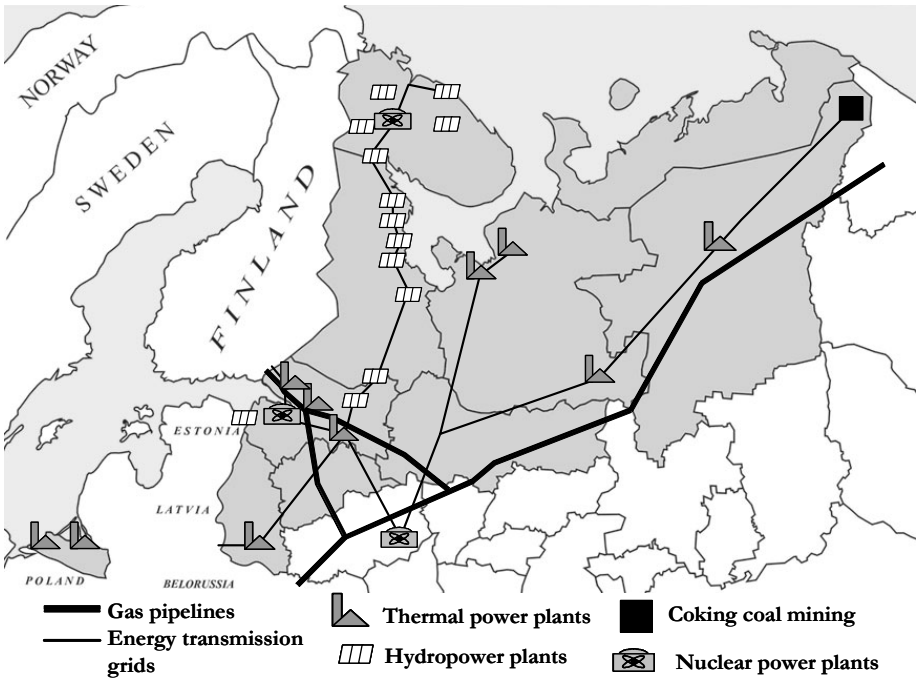
The main related and supporting sectors with an impact on the metal cluster's development are: energy; logistics; scrap collection and processing; refractory; prospecting; banking, finance and insurance; business consulting; IT; environmental protection.

Collection and processing of scrap metal, as well as logistics, due to their particular importance to the metal cluster, are examined in detail in Appendices 3 and 4, respectively. The current situation in prospecting has already been described in Section 3.2. This section will discuss other related industries.

Energy

Metallurgy production, especially production of non-ferrous metals, is characterized by high energy needs, so the energy industry plays a decisive role in the development of the metal cluster. Energy tariffs account for a significant portion of production costs: up to 27%, according to data provided by RAO UES of Russia in 2000. In the future, as the tariffs continue to grow, this share will inevitably increase.

Figure 5.4 Energy System in Northwest Russia



At present, production and distribution of electric power in Russia is controlled by the State through the controlling share of capital in RAO UES of Russia holding. Another state energy company, Rosenergoatom, operates all nuclear power plants, including the Leningrad and Kola power plant, which together provide more than 40% of Northwest Russia's electric power. In addition, enterprises of Northwest Russia also consume some energy provided by the Kalinin Nuclear Power Plant (located in the Tver region, beyond the boundaries of Northwest Russia).

The existing relatively low level of state tariffs for electric power and natural gas is one of the main factors of price competitiveness for Russian metallurgy companies. Still, power and fuel requirements per unit of production are much higher for Russian companies than in advanced countries, while their own power-generating facilities are underdeveloped. In the future, tariffs will inevitably grow toward international levels, and companies will face a problem to reduce costs.

The ongoing reform of the electric energy sector includes privatisation and establishment of a competitive environment in the spheres of power generation and sale, but distribution of energy will remain under State control. These reforms should enable companies to choose their energy suppliers, and thus manage their energy expenses. In addition, the reforms will diminish companies' dependence on the policies of regional authorities, which often use their ability to regulate tariffs as an effective instrument to influence business.

Natural gas is supplied to the region via gas main pipelines from Western Siberia. The gas industry will remain a State monopoly during the next 5 to 8 years, with plans to initiate reforms only after complete restructuring of RAO UES of Russia.

The Pechora coal basin (in the Republic of Komi), with its share of coking coals amounting to 60%, is a major raw materials base for the coke and chemical industries. However, the basin is located in severe climatic conditions (the main part of it is located within the Polar circle), which substantially increases extraction costs.

In the Vorkuta area, there are two companies developing coking coal deposits, the Vorkutaugol and the Vorgashorskaya Mine, which together produced 12 million tons of coal in 2000, representing 19% of the total coking coal extraction in Russia[3]. The main consumer of coking coals is Severstal, which receives up to 80% of the output. It should be noted that coal extraction in the Pechora basin is unprofitable now, and extraction of USD 1 worth of coal costs USD 1.14. However, because of the strategic importance of domestic coal extraction, mining companies are subsidized by the

[3] According to Rosugol data for 2001.

State. Severstal currently holds a 15% share in Vorkutaugol and is planning to purchase a controlling stake in the company.

Refractory

Production of refractory materials in the Northwest region is provided by the Borovichi Refractory Plant (in the Novgorod region), which is one of the biggest refractory plants in Russia, with its share of total production amounting to 12% in 1999. The plant is located not far from Severstal and specialises in production of alumina-silicate refractories from local fire clay. The plant produces all types of alumina-silicate refractories, from fireclay lining to alumina refractories. The capacity of the plant is more than 500,000 tons of refractories of all types a year.

Business Consulting and IT

At present, the business-consulting sector in Russia is not sufficiently developed to provide services according to international standards. Russian companies still prefer to employ the services of their own consulting departments. Independent consultants are commissioned mostly for auditing and for joint projects with foreign partners. Future expansion of the consulting sector will depend on the overall growth of the Russian economy, as well as a gradual adaptation by Russian companies of international business practices.

Presently, the use of information technologies in the metal cluster in Northwest Russia is very low. Information systems are installed only at the largest companies. In addition, those systems cover only several technological processes and elements of production. There are no com-

Box 5.1 Problems of Introducing IT at Metallurgy Enterprises

According to experts, the Russian market for integrated management and control systems (Enterprise Application Suite, EAS) is presently estimated at only USD 50 million. The share of metallurgy companies purchasing EAS licenses is only about 1%. Companies specialising in the development and implementation of EAS explain such a low level of activity by metallurgy enterprises with the following reasons:

- unwillingness of Russian enterprises to change;
- insufficient managerial skill;
- absence of real need for EAS at certain enterprises;
- delegation of responsibility for EAS introduction and its results to only companies' IT departments, a lack of support by top management;
- ambiguous formulation of needs by metallurgy companies, poorly defined project aims and targets.

plex (integrated) information systems in any enterprise, nor any system that provides information on interactions between different companies, or between a company and its consumers.

Banking, Finance and Insurance

The Russian banking and finance sector is still in the stage of development, which, during the last decade, was restrained by frequent economic crises and inefficient regulation by the State.

In view of the high capital requirements and long-term nature of projects in metallurgy and metal-working, most banks are reluctant to provide long-term financing. Furthermore, industrial companies have difficulty obtaining short and medium-term loans, because of the low depreciated value of their assets, provided as collateral. There are examples of substantial credits, but they more often result from personal connections of top managers, than from the actual financial state of the companies. The main players in the metallurgy industry have closely affiliated banks (for example, Severstal is affiliated with Promstroibank, and Norilsk Nickel with Rosbank), but these banks mostly provide clearance services.

As for the stock market, at this time it fails to enable metal cluster companies to finance their development needs. Currently, the Russian stock market is inefficient. Most of the currently traded stocks and other securities are difficult to liquidate, which limits potential buyers which seeking investment opportunities over certain industries. Consequently, industry owners are reluctant to put their assets on the public market. Due to the extremely low development rate of the Russian stock market, it is unlikely to become a widely used instrument of attracting funds to finance the development of metal cluster companies in the short term.

As a consequence, the underdeveloped banking and financial sectors force companies of the cluster to rely on their own resources only when attempting major development projects.

During the Soviet period, there was only one insurance company serving both private individuals and corporate entities. It was Gosstrakh (with Ingosstrakh serving exporters). However, the disintegration of the Soviet Union deprived Gosstrakh of its monopolistic position, bringing to life numerous small-scale insurance companies whose assets are mostly insufficient to provide full-scale insurance to industries. Both the existing range and the quality of services offered by Russian insurance companies are well below standards typical for developed economies, a key factor behind the unfavourable investment environment. Activities of international players on the Russian insurance market are similarly restricted.

Environmental Protection

Because of their specific technological processes and use of outdated equipment, enterprises of ferrous and non-ferrous metallurgy are among the 'dirtiest' in Russia, contributing 23% and 16% of all Russian emissions, respectively. As for solid toxic waste of all hazard categories, non-ferrous and ferrous metallurgy enterprises are at the top of the list of all industries, providing 29% and 26% of such waste, respectively.

Table 5.4 Emissions[4] by Enterprises of the Metallurgy and Metal-working Cluster in Northwest Russia in 2000

	Region	Emission volume	
		Into the atmosphere, thousand tons	Into surface waters, million m³
Severstal	Vologda Region	339	32.5
Pechenganickel	Murmansk Region	161	28.7
Severonickel	Murmansk Region	57.4	18.3
Karelsky Okatysh	Republic of Karelia	39.7	15.3
Apatit	Murmansk Region	18.4	18.2
Nadvoitsy Aluminum Plant	Republic of Karelia	9.1	n/a
Izhora Plants	St. Petersburg	3.1	n/a
Kovdor GOK	Murmansk Region	n/a	56.7
SevRedMet	Murmansk Region	n/a	16.5

Source: State report "On the Situation of the environment in the Russian Federation", Ministry of Natural Resources of the Russian Federation (2001)

As is clear from the table 5.4, the main polluters in Northwest Russia are the leading producers of ferrous and non-ferrous metals: enterprises of Severstal and Norilsk Nickel holdings. It is notable that some types of emission from Russian metallurgy enterprises (mostly, sulphur oxides) are distributed far beyond the national borders of Russia to Finland, Norway, and even Sweden.

Even though the level of environmental emissions by the Russian enterprises has slightly decreased over the last decade, this fact should not be viewed as a positive long-term trend, since it is explained not by stricter environmental control, but simply by a decline in production. At present, there are indicators that the level of emissions is starting to grow again.

---

4 Carbon oxides, sulphur oxides, nitric oxides, metals oxides and other.

As yet, there is no network of independent services responsible for environmental protection in Russia. Evaluation of environmental damage is often carried out by departments of polluting enterprises, which leads to a distortion of data. An almost complete absence of effective sanctions for emissions by the State does not provide an incentive for companies to introduce cleaner technologies.

5.6 Education and R&D

In Northwest Russia, there is a well-developed network of specialised education for the in metallurgy and metal-working industries.

The leading higher education institutes for the cluster are the following:

- *St. Petersburg State Polytechnic University* – departments of physics of metals, ferrous metallurgy, non-ferrous metallurgy, foundry of ferrous and non-ferrous metals, the theory of metallurgy and thermal processing of metals, metal forming, welding metallurgy, machines and technologies for metal processing;
- *St. Petersburg State Mining University* – departments of non-ferrous metallurgy, metallurgy machines and equipment, prospecting and mining;
- *St. Petersburg State Engineering Institute* – departments of machines and foundry technology, machines and metal-processing technology;
- *Cherepovets State Industrial Institute* – departments of ferrous metallurgy, metal processing, metallurgy machines and equipment.

Table 5.5 Key Northwest Russian Institutes for the Metallurgy and Metal-working Cluster

	Students, total	Teachers, total	Students specialised for cluster needs	
			Total number	Graduates in 2000
St. Petersburg State Politechnic University	19,297	2,011	1,457	156
St. Petersburg State Mining University	5,468	413	3,980	517
St. Petersburg State Engineering Institute	4,775	247	2,504	233
Cherepovets State Industrial Institute	9,138	486	1,254	182

Source: data provided by the institutes

Metallurgy companies also actively collaborate with the leading metallurgy university in Russia – Moscow State Institute of Steel and Alloys (MISA). Out of all the technical schools in Northwest Russia, the largest is Cherepovets Metallurgy College.

During the last decade, specialised education required by the metal cluster, as well as the whole Russian system of education, faced a number of serious problems, including the following:

1. Sharp decline in State financing

Along with a sharp decrease in Russian GDP, the share of budget financing of all types of educational institutions fell compared to the Soviet period. The decline in financing led to the deterioration of educational facilities and a decrease in the prestige of the teaching profession (young people almost stopped going to work as teachers). As a result, the quality of education also fell significantly, especially in the more advanced fields of study.

2. Breakdown of traditional links between production and education

A breakdown in links between industry and education has resulted in the fact that the graduates, with all of their substantial academic training, lack required practical skills and familiarity with the specifics of modern production processes. Education do not fully corresponds to the current requirements of the industry, because it both retain a number of outdated courses and lack (or provide an insufficient level of training) in highly necessary courses relevant for modern industry, such as economic courses, IT, etc.

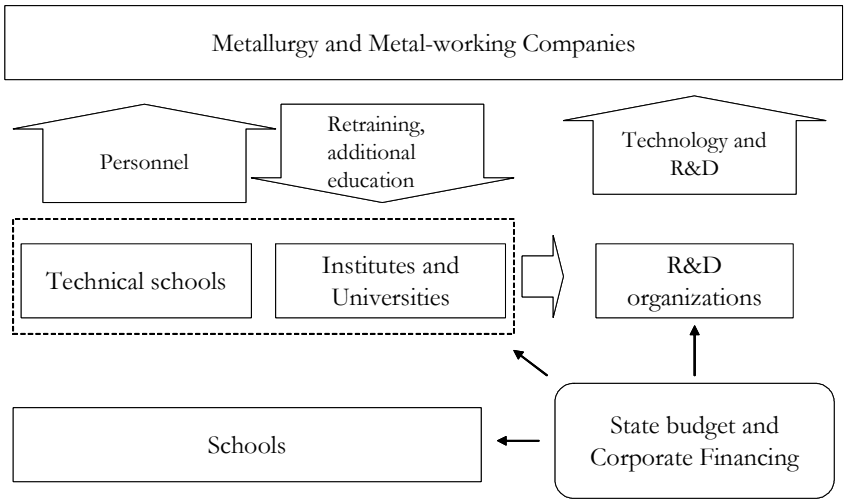
It has only been in the last few years that the leading companies of the cluster realized the necessity to forge links with educational institutions, and started financing specialised courses aimed at training specialists for particular production facilities. As one example, Severstal established a scholarship and a number of other incentives for students who are then obliged to work at the enterprises of the holding after graduation.

Still, on the whole, the level of cooperation between industry and education remains quite low, as companies are currently unable to provide sufficient financing for education while the State is unable to provide the necessary funds, too.

3. Decrease in the prestige of technical and engineering education

The low level of salaries, occupational hazards and remote location of major industrial sites in depressed regions, all contribute to decrease the number of students willing to specialise in fields relevant for the cluster. The majority of top secondary school graduates in the largest Russian

Figure 5.5 Educational and R&D Infrastructure and its Primary Funding Principles



cities choose specialisation in non-technical spheres. It has only been during the last few years that the situation has started to change for the better, mostly due to industrial growth and an excessive number of economics and law graduates in the labour market.

When discussing issues of education, Russian experts emphasise the fact that the most critical aspect is specialised technical education. It is characterized by lowest prestige and an even lower level of government support and ability to survive on the basis of own resources, than the system of higher education.

The metallurgical R&D potential of Northwest Russia is represented by a number of specialised organisations. Among the largest are: the All-Russian Aluminum-and-Magnesium Institute (VAMI), Gipronickel, Gipromash-enrichment, Giproruda, Lengipromez, the St. Petersburg Refractory Institute, Mekhanoobr-Tekhnika, Giprometiz. They are all located in St. Petersburg. These organisations carry out research in various fields, covering the whole metallurgy production cycle from extraction and enrichment of ferrous and non-ferrous ores to production of final products. They also design metallurgy plants and equipment. At present, they employ about 3,000 people in total.

R&D of the metallurgy and metal-working cluster has faced a number of major problems over the last decade. A sharp decrease in demand resulted in the financial collapse of many R&D organisations (with the exception of Gipronickel, which became part of Norilsk Nickel in 1990).

Thus, R&D equipment has not been modernised for a decade, and a whole generation of qualified personnel left these organisations in search of higher salary.

In order to survive in the new economic environment, R&D organisations had to move their activities toward various engineering projects, business and technological consulting services, etc. As a result, their huge

Box 5.2 All-Russian Aluminum-and-Magnesium Institute

The All-Russian Aluminum-and-Magnesium Institute (VAMI) was founded in 1931 as the leading institute for designing alumina, aluminum, magnesium and electrode production facilities and enterprises.

During its 70-year history, the Institute designed over 50 enterprises, both in the former Soviet Union (including all today's alumina, aluminum, electrode and graphite plants in Russia) and abroad (in China, Turkey, Egypt, Israel, Yugoslavia, etc.).

After privatisation in 1992, the Institute underwent major restructuring, and its branches in Irkutsk, Kamensk-Uralsk, as well as the VAMI Leningrad Experimental Plant (now the LITS Aluminum Plant) were established as independent joint-stock companies.

During the 1990s, the institute faced a sharp decrease in budget financing, and had to cut down a number of its R&D activities. The most significant negative result of the transition period, however, was the loss of a large number of qualified personnel: there are currently about 600 staff members at the Institute, compared to over 2,000 in the late 1980s.

During the last decade, the number of R&D projects commissioned by production companies also decreased significantly, and it has only been in the last few years that major investment programs, implemented by major Russian aluminum companies (RusAl, SUAL, Metallurg), included the Institute in modernisation and development of aluminum industry. The Institute's experts completed the designs for an aluminum plant in Vsevolozhsk (in the Leningrad region), for the development of the Timan bauxite deposit (Komi Republic), as well as a number of other projects. Still, about 40% of the Institute's revenues come from its secondary activities (mainly, renting out premises and production sites). Orders from foreign companies now account for less than 25% of the Institute's annual income.

At present, the main categories of R&D activities at VAMI are the following:

- Equipment and technology for the production of alumina from unconventional raw materials;
- Production of primary aluminum;
- Technology and equipment for the production of magnesium from various kinds of magnesium-bearing raw materials;
- Production of crystalline silicon aluminum-silicon alloys;
- Production of baked anodes, anode paste and other carbon materials;
- Environmental protection.

specialised R&D potential has gradually been lost, and now, when demand for their services has improved slightly, many R&D organisations face difficulties in providing the required level of research and project development. As a result, some production companies have to commission more expensive but higher-quality services from foreign R&D companies.

6 Factors of Competitiveness and Development Trends

The previous chapters of this study contained a systematic review of data on the history, present situation and characteristic features of the metallurgy and metal-working cluster in Northwest Russia. On the basis of that data, this chapter aims to provide an analysis of the cluster's factors of competitiveness and identify some specific trends, which may influence its development in the future.

Figure 6.1 Factors of Competitiveness of Northwest Russian Metal Cluster

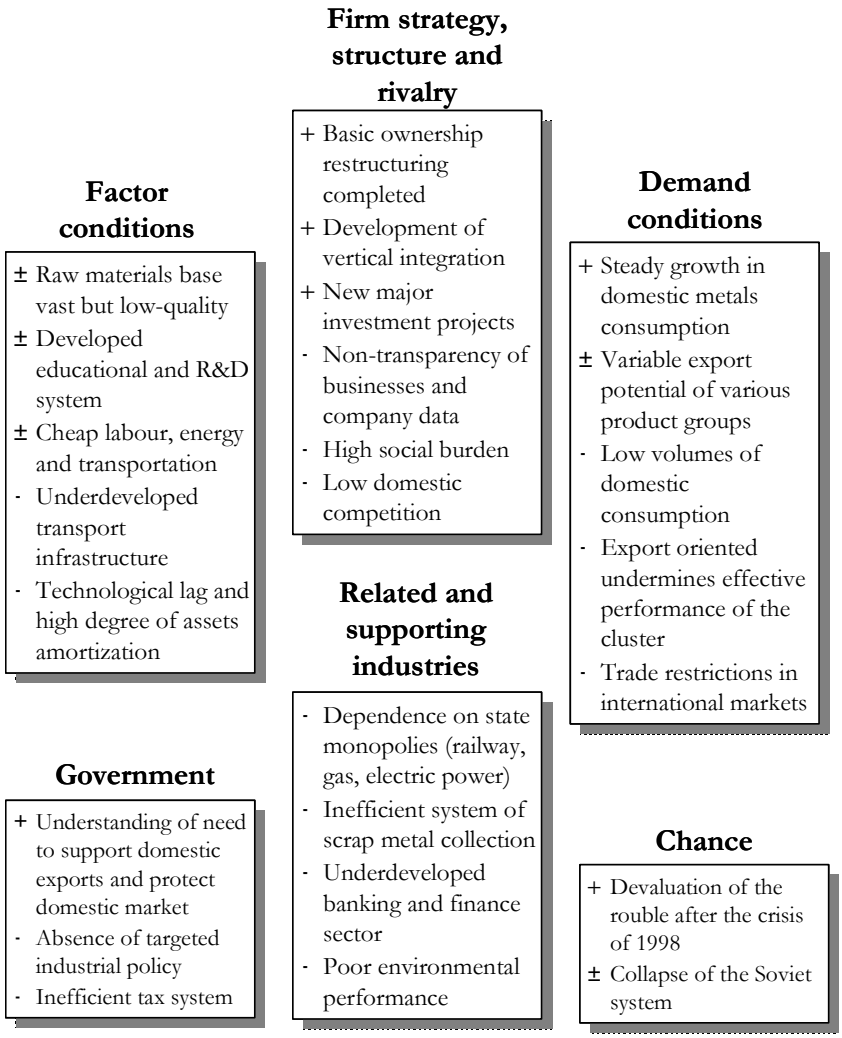


Figure 6.1 describes the cluster's main factors of competitiveness, grouped in accordance with a widely used method of analysing competitiveness of industrial clusters.

Basic production factors – raw materials base, production facilities, infrastructure and human capital – were inherited in the cluster's development from the Soviet period. During the last decade, these factors made Russian metal products competitive. However, investment into the development of these factors has so far been clearly insufficient, leading to the exhaustion of the previously accumulated potential.

Demand for cluster products suffered dramatic changes after the collapse of the centralized planning economy. The domestic market shrank due to ongoing crises in the major metal-consuming industries - machine building and construction. Domestic market capacity is still inadequate for effective development of the cluster, despite an increase in demand seen in the last few years.

In order to survive, companies of the cluster had to export most of their output, which led to a deterioration in product structure, since only raw materials and products with low added value proved competitive in the international markets. Besides, many Russian exports are limited by trade barriers imposed by foreign governments, in order to protect their domestic industries.

In the metallurgy and metal-working cluster in Northwest Russia, the process of privatisation and redistribution of assets has, on the whole, come to an end. This gives the newly established owners the possibility to address the strategic issues of planning and long-term production efficiency. Right now, there are a number of major investment projects underway, including those aimed at modernisation of old and construction of new production facilities. However, the companies of the cluster are still characterized by an excessive number of underpaid employees, an obligation to finance social institutions and infrastructure in the communities where metallurgy enterprises dominate, and inadequate attention to environmental issues.

Furthermore, related and supporting industries are undergoing reforms aimed at the establishment of structures that are more appropriate in the current economic environment. The main problems of these industries remain the dependence of producers on transport, fuel and energy tariffs controlled by the State, underdevelopment of Russian banking and financial sectors, as well as inefficiency of the existing system of scrap-metal collection and processing.

The state continues to exert substantial influence on the development of the cluster, but this influence is largely sporadic and often ineffective.

The government's domestic industrial policy is characterised by a lack of coordination between various authorities and an absence of clear goals and coherent activities. Support of domestic producers in international markets is undermined by the fact that Russia has not yet entered the World Trade Organization.

Below, we analyse factors of competitiveness and development trends in the metallurgy and metal-working cluster in Northwest Russia in more detail.

6.1 Factor Conditions

Northwest Russia possesses a rather extensive base of natural raw materials for the metallurgy, including large developed deposits of iron ores, coking coals, aluminum ores, complex copper and nickel ores that also contain cobalt and platinum metals, and ores of rare-earth metals. In addition, there are prospected deposits of chromium and titanium ores, the development of which has not yet been started.

The resources of prospected deposits are sufficient for long-term development, given the current rates of extraction, but mining enterprises are already facing the need to invest substantial additional funds into further development, due to depletion of the best and more easily accessible ore reserves. Even more investment is required for development of new deposits that were prospected during the Soviet period, but have not yet been exploited. Furthermore, the prospected resource base has not expanded because wide-scale geological prospecting was almost completely terminated following the Soviet period. In summary, it can be claimed that the resource base in the region (as well as throughout Russia) is deteriorating every year.

Another negative factor associated with natural resources is the location of most large deposits in remote, under-populated regions with severe climatic conditions. This requires large additional investment, both for development of such deposits, and for transportation of the products.

As a result, the largest companies in Northwest Russia are trying to find new sources of raw materials. For example, Severstal has practically discontinued further development of the Olenegorsk iron-ore deposit, where the switch to underground-extraction methods will inevitably make the ore much more expensive and, as an alternative, is planning to invest in further development of the Kursk ore deposits, where cheap open-cut mining is possible. The ore itself contains a higher percentage of iron than in Olenegorsk, and the distance by railway to Severstal production facilities in Cherepovets is slightly shorter.

Norilsk Nickel is also unsatisfied with the remaining quantity and quality of copper-nickel ores in the developed deposits of the Kola Peninsula. Severonickel, the main enterprise of the holding located in the Murmansk region, mostly processed ore from Norilsk during the last few years. In the future, management is planning to produce mostly cobalt and platinum metals at Severonickel.

On the whole, Russian raw materials are still rather cheap (compared to current world prices), giving the cluster one of it's main factors of price competitiveness at the present time. About secondary raw materials – metal scrap – see Appendix 3.

Geographical location of Northwest Russia, being in relative proximity to the markets of Europe (compared to the regions of the Urals and Siberia), may be viewed as a certain advantage. Over the last few years, the EU has introduced a number of barriers to Russian metal-product imports (especially concerning ferrous metallurgy), and the market shrank considerably. Partly because of this, Asian markets have become more significant for Russian metallurgy, but these markets are quite far from Northwest Russia.

The transportation infrastructure in Northwest Russia is underdeveloped. Capacity of transport corridors and traffic density are much lower than that of European countries. This is especially true for the northern and north-eastern parts of the region, where the bulk of natural resources is located. Construction of new transport links requires large investment and, without budget financing, is possible only by a few major companies. The only example of a large-scale transport project carried out recently is the construction of a railway link to the Middle Timan bauxite deposit, financed by the interregional aluminum holding SUAL.

Mainline railways, which are crucial for the cluster, are still a state monopoly, and are characterised by very low quality transportation services. One advantage of Northwest Russia is the fact that, after the collapse of the Soviet Union, the region became the main sea gateway of Russia. At present, Northwest Russia is witnessing construction of several new seaports. Detailed information on the transportation infrastructure, its main distinctive features and bottlenecks, is contained in Appendix 4.

Production facilities of the metallurgy and metal-working enterprises in Northwest Russia were mostly inherited from the Soviet period. Over the last decade, utilization of their production capacity has decreased from almost 100% to 70-80% and below. It should be noted that the facilities manufacturing products with higher added value are the most underutilised, since current demand for this products fell dramatically in comparison to domestic demand in the Soviet period.

Table 6.1 Utilization of Russian Ferrous Metallurgy Production Facilities, %

	1990	2000
Market iron ore	98	97
Pig iron	94	84
Steel	94	78
Rolled metal	92	80
Steel pipes	94	48

Source: Ferrous Metallurgy in the Russian Federation, 2001

Capital assets of the cluster are, on average, worn out for about 50% (for older enterprises, this indicator reaches 80-85%). Over the last few years, due to growing export sales, enterprises have been modernising their facilities more intensively (see Appendix 2 for a more detailed information of this process), but this mostly concerns facilities for export products, that is, products with low added value. For example, Severstal is the first to renovate its primary steel-production lines (open-hearth furnaces are replacing by oxygen-converter plants), but this stage of modernisation has long been complete in developed economies.

As a result, we may claim that the cluster's technological lag behind advanced economies is proceeding negatively. The high level of emission is another negative feature of the sector, due to outdated technological processes and lack of incentives (in the form of effective environmental legislation) for cleaner production and investment into costly environmental projects.

Traditionally, high levels of education and R&D institutions in Northwest Russia provided the industry with qualified personnel and innovation, and have been considered one of the main advantages of

Table 6.2 The Share of Wages and Salaries in the Cost Structure of the Metallurgy Companies in 2001, %

Company	Country	The Share of Wages and Salaries in the Cost Structure, %
Severstal	Russia	12.6
Outokumpu	Finland	19.6
Rautaruukki	Finland	19.7
Corus Group	UK	22.3
Cosipa	Brazil	22.5
Bethlehem Steel	USA	30.1
POSCO	South Korea	8.1

Source: data provided by the companies

the metallurgy and metal-working cluster in the region. However, over the last decade, this potential has been lost to a large extent, and now the main advantage of the local workforce is its low cost.

The educational system of the region continues to produce a vast number of graduates in technical positions, but the quality of their training is, at present, inferior to that in developed countries, a fact which can primarily be explained by a breakdown of links between education and industry. In addition to poor knowledge and skills in modern technologies, the present low quality of the workforce is a result of the country's low standard of living, which results in low mobility of the population, poor conditions for further education and re-training, and a noticeable difference in quality of life in St. Petersburg and other big cities on one hand, and remote regions, on the other. On the whole, the mentality of an underpaid worker, who does not feel fully responsible for the results of his or her work, still does not differ much from that of the Soviet past.

There also exists a sharp differentiation within the educational system itself: While higher education is characterized with high social prestige and thus has a potential for survival, the system of secondary technical education virtually collapsed during the last decade. Still, it is this type of training that is most required by the industry, in both the metallurgy and metal-working sectors. As a result, the shortage of qualified shop-floor personnel is even more pressing than the shortage in qualified technicians and engineers.

Because of a sharp decrease in the number of orders, the R&D system has suffered a deep crisis and, at present, its innovation potential is only in small demand. R&D institutions lost many of their highly qualified specialists, which has resulted in a visible generation gap in their staffs. The recent partial recovery of the Russian economy does not change the situation, because the industry does not feel the need for innovations, due to the limited the domestic market and the demand for mostly low added value products in the world market.

As a result, the research and development potential of the cluster has declined considerably. Innovations offered by Russian R&D institutions are inferior to those developed by their foreign competitors in many respects, including documentation packs, implementation mechanisms, servicing, etc. Besides, Russian companies market their products very poorly and, so far, have not been driven out of the market completely primarily due to two main reasons: cheapness of their products compared to Western analogues and knowledge of local specifics and conditions for practical implementation and maintenance of newly introduced technologies. It is obvious that these factors alone cannot guarantee competitiveness of the Russian R&D sector in the long term.

In summary, it can be argued that the potential of all production factors that developed the cluster during the last decade has been practically exhausted. Low prices for raw materials and labour will probably not remain at their present levels for very long, and further development of all these factors will very soon require large-scale investment, which is, in its turn, dependent on radical changes in the industrial, regional and national investment climates.

6.2 Demand Conditions

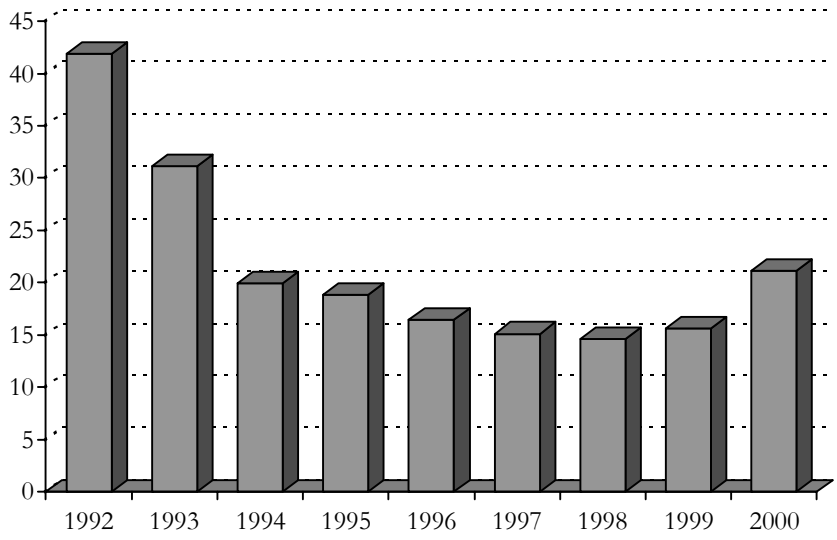
During the Soviet period, the metallurgy and metal-working cluster mostly supplied the domestic market and satisfied the demand from various sectors of machine building and construction. In the 1990s, structural changes in the Russian economy triggered a sharp decrease in the domestic market, and the companies of the cluster, even though they reduced their production output, had to search for a share in international markets. At present, over 50% of Russian ferrous metals and 80-85% of non-ferrous metals are exported.

The ratio of domestic and international prices for metal products changed several times during the 1990s. In 1992, domestic rates were about 20% of world prices. From 1993 to 1995, mostly due to a gradual increase in tariffs of state monopolies, domestic prices increased to 60% of world levels. After that, up until the August 1998 financial crisis, the "exchange-rate corridor" resulted in domestic prices temporarily exceeding even the world rates. Export sales became unprofitable, but domestic consumption did not grow in compensation, and international markets were still the only reliable source of liquidity. After the 1998 financial crisis and devaluation of the rouble, domestic prices fell to about 50% of the average world level. Now, the trend toward price convergence is again gaining momentum, mainly due to the continuing growth in energy tariffs and prices for raw materials, as well as because of a decrease in world prices for most types of metal products.

A sharp decrease in domestic consumption of metal products in the 1990s resulted from a deep recession in the Russian machine-building and construction industries. Within the machine-building sector, the crisis affected both the most metal-consuming sectors mainly interested in ferrous-metallurgy products (the military complex, transport industry, mining machine-building industry, etc.), and the industries consuming non-ferrous metals (aerospace, electrical engineering and radio-electronic industries). In the 1990s, the construction industry greatly diversified to serve the various new standards of residential construction. This not only resulted in a reduction in overall construction volumes, but also in a de-

crease of specific metal consumption, due to the increased use of ceramic, wood and plastic materials.

Figure 6.2 Annual Consumption of Steel Products in Russia, Million Tons



Source: International Iron and Steel Institute, 2001

Table 6.3 Consumption of Non-ferrous Metals in 1998, Thousand Tons

	Aluminum	Copper	Nickel	Zinc	Lead	Tin
Russia	488	133	11	117	67	2.4
USA	5,814	2,883	150	1,297	1,741	37.4
Japan	2,080	1,250	173	659	308	27

Source: www.ampoc.ru

As a result, net consumption of steel products in Russia decreased by more than 2 times, and consumption of non-ferrous products by 3 to 5 times[5]. At present, Russia consumes several times less steel products per capita than world leaders, and more than 10 times less non-ferrous metals.

The financial crisis of August 1998 stimulated the development of Russian industry, including machine building, and domestic consumption of

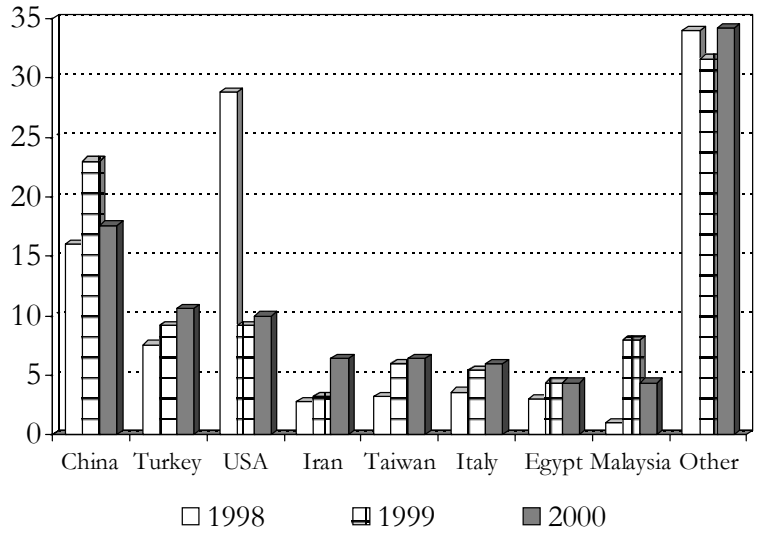
[5] Net consumption is calculated as total production volume, plus import and minus export volumes.

metal slightly increased. However, metallurgy and metal-working enterprises, which had significantly changed their product ranges over the preceding years towards more products with a lower added value (which are competitive in international markets), were not able to react to the increase in domestic demand promptly enough, and, as was stated in Chapter 4, the market segment of more high-tech products (alloyed steel grades, tubes with special coverings, semi-processed components, etc.) was partly occupied by foreign companies. Besides, Russian companies are still inferior to their Western competitors in marketing, sales and quality.

According to the opinion expressed by most Russian experts, the lowest point in the domestic demand has already been passed. In the near future, a substantial increase in demand for ferrous and non-ferrous metals is expected, due to growth in the shipbuilding and transportation industries, the need to replace vast amounts of railway tracks, railway carriage wheels, fixtures, pipes of various types, power-line wires, etc. Current trends in the domestic metal-products market are described in more detail in Appendix 1.

The role of export in the development of the cluster can be evaluated as salutary over the last decade. For the majority of enterprises, export sales provided an opportunity to survive under sharply diminishing domestic demand.

Figure 6.3 Russian Exports of Rolled Ferrous Metal Products, by Country, %



Source: Expert Magazine, No. 26, 2000

Box 6.1 ISO Certification of Russian Metallurgy Companies

At present, certification of Russian companies in accordance with international standards is developing rather quickly. The majority of large and medium-sized companies either have completed the ISO 9000 standard certification procedure, or are in the final stages of such procedures.

At present, the following metallurgy companies in Northwest Russia have obtained certificates:

- Norilsk Nickel – ISO 9000
- Severstal – ISO 9002
- Krasny Vyborzhets – ISO 9002
- Izhora Plants – ISO 9001
- Petrostal – ISO 9002
- Gipronickel Institute – ISO 9001

The companies name the following reasons for certification:

- Possibilities for promotion of their products abroad;
- Possibilities of cooperation with large foreign consumers;
- Promotion of company image in Russia;
- Possibility of reforming management practices and reaching higher levels of performance;
- Possibilities for higher product quality;
- Conditions set by foreign partners.

Unfortunately, it should be noted that the majority of Russian companies have the only aim of obtaining the certificate as such, and not the introduction of comprehensive quality control and management systems. This is perhaps the main reason that most of the ISO 9000 certificates received by Russian companies did not result in significant progress in the quality of business.

However, the cluster's high export potential was inherited from the Soviet period, and there has been almost no further development of this potential since then. As a result, the companies of the cluster are now facing major sales problems, both due to growing competition from foreign producers, and because of the trade barriers against Russian price dumping in a number of international markets. This mostly concerns ferrous metallurgy, since non-ferrous metals are characterized by much higher liquidity and do not face trade barriers in most of international markets.

Under tougher world-trade conditions, Russian companies are forced to look for new markets (see figure 6.3). They are losing their positions in developed markets, where products with higher added value are more in demand, and are expanding their presence in less developed markets due to the lower prices of Russian products resulting from cheap raw materials, fuel, energy and labour.

While export sales provide most of the revenues for the majority of metal producers, it still does not create an incentive to increase their competitiveness by modernising equipment and improving management practices. As was demonstrated above (see Chapter 4), it is products with low added value (primary metals and rolled stock) that constitute the major part of export sales.

These products do not require regular upgrading of technological processes and training of personnel. Thus, it can be stated that the existing large export of the cluster, on the whole, prevents effective development, by means of conservation of its current narrow product range. Some isolated measures, such as certification of enterprises in accordance with international standards, are often of a formal nature and do not significantly improve the general low quality of cluster products.

The authors believe that the decisive factor in increasing competitiveness of the metallurgy and metal-working cluster is a growth in volume and quality requirements of the domestic market, since only that can create real conditions for more efficient performance. The increase in share of products with a higher added value, will, in turn, establish the basis to maintain a high export potential.

6.3 Company Strategy, Structure and Competition

During the Soviet period, enterprises of the metallurgy and metal-working cluster developed in accordance with a centralised plan. Raw materials, fuel and energy, and products were distributed from central ministries via stable channels. Full-cycle metallurgy plants were located in the proximity of raw materials and energy sources (with the exception of the Cherepovets Metallurgy Plant, now Severstal, see Box 3.1); enterprises processing scrap metal were located near major metal-processing centres. Scrap-metal collection was also centralised, and provided a rather high share of secondary raw materials for the industry.

Under the Soviet system, rolling mills were highly specialised and, consequently, did not compete with each other, since they produced different types of products for specific domestic consumers. Company structure was very complex and served primarily to employ maximum of the local population, especially in areas where metallurgy enterprises provided the most jobs. Environmental effects were almost totally ignored, and metallurgy enterprises were the primary sources of heavy environmental pollution.

In the 1990s, the Russian economy as a whole, and the metallurgy and metal-working cluster in particular, suffered major changes. Apart from

the market changes described above, a very important development was the introduction of new forms of ownership, which resulted in partial restructuring of companies and break-up of most vertical and horizontal business links.

Box 6.2 Russia's 'Wild West': Peculiarities of New Ownership in the Transition Period

Russian business, if only due to its short history, has not been able to establish any traditions, business ethic or rules of the game, so, in the beginning of its history, it closely resembled the 19th-century American Wild West. There were 'cowboys' and 'sheriffs,' but the methods employed by both groups were quite similar and aimed at only one thing: grabbing assets.

Even putting this likely comparison aside, it is a matter of fact that the restructuring of the Russian metallurgy industry was accompanied by a large number of public scandals, lawsuits, fictitious bankruptcies, channelling of assets to subsidiary companies, diminishing of stakes held by minority shareholders by means of additional share issues, etc. Close connections with officials allowed the management to buy companies at auctions at undervalued prices. None of the metal holdings has been able to avoid such events over the last decade. There were almost no 'clean' property transactions, simply due to the fact that 'grey' transactions had much lower costs.

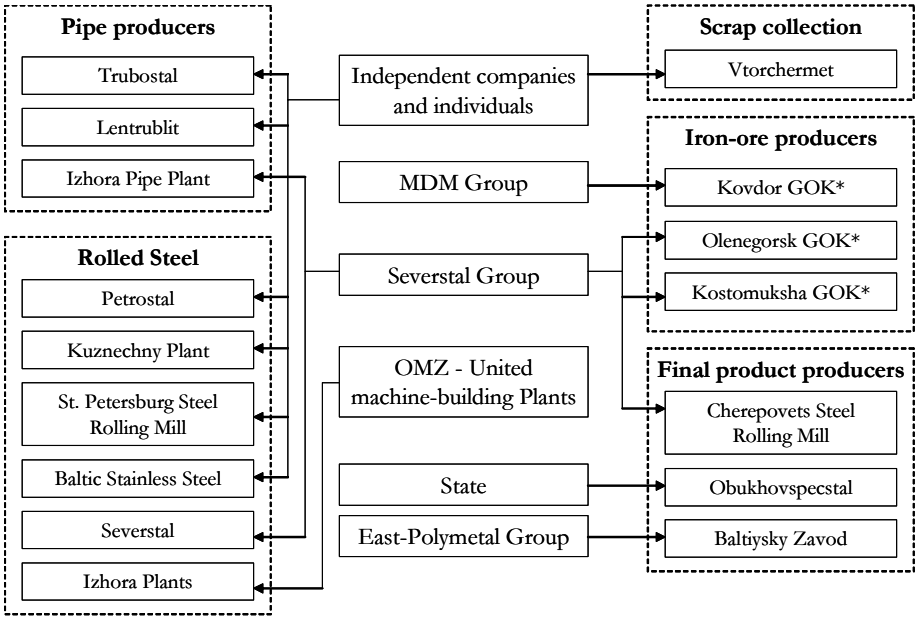
Privatisation of Russian metallurgy enterprises, the second largest sector of the Russian economy in revenue terms, after the energy cluster, was carried out in the first half of the 1990s. The State retained only a small number of low-income enterprises that have strategic significance for the military industry.

By far, not all new owners were interested in running successful businesses. Many of them just used their ability to gain control over large assets at low price – often as a result of connections to state officials. This led to a decrease in output and worsening of overall economic performance of many companies. Besides, privatisation was not a momentary action, and redistribution of property continued in the cluster throughout the 1990s, sometimes with criminal methods.

By now, it can be stated that the majority of property redistribution in the cluster has been completed, and a number of key players emerged, among them in Northwest Russia are the following:

- ferrous metallurgy and metal working – Severstal and the United Machine-Building Plants (OMZ);
- non-ferrous metallurgy and metal working – Norilsk Nickel, Siberia and Urals Aluminum (SUAL), and Metallurg.

Figure 6.4 Structure of Ownership in Northwest Russia: Ferrous Metallurgy and Metal-working



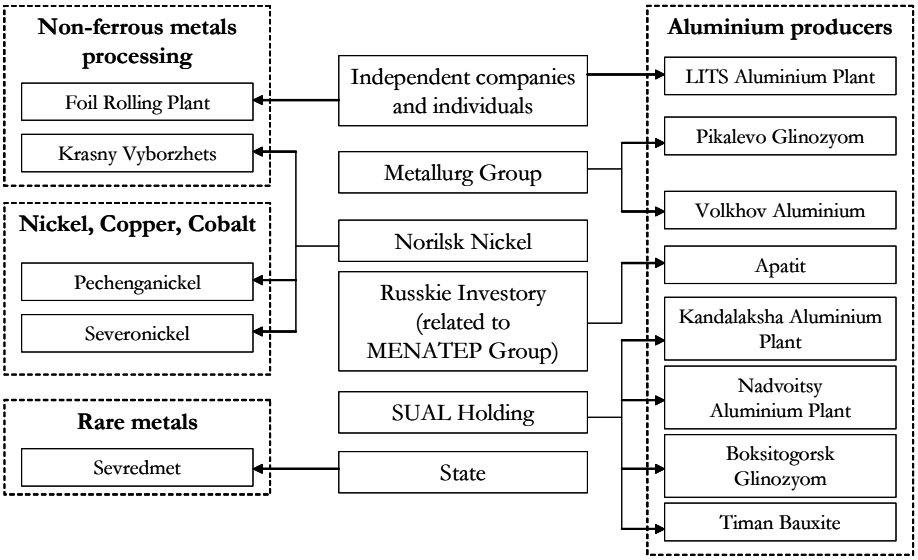
* GOK – Ore mining-and-enrichment plant

All these companies are leaders on the national level as well. Severstal is the second biggest Russian ferrous-metallurgy company (after the Magnitogorsk Metallurgy Plant in the Urals) and the 19th in the world. OMZ is the biggest metal-working and machine-building holding in Russia, with its main facilities located in St. Petersburg and Yekaterinburg (in the Urals region). Norilsk Nickel, with its main facilities located in the city of Norilsk in North Siberia, is in fact the Russian monopolist in nickel and platinum-metals production (and the leading company in this sphere in the world), as well as the biggest producer of copper and cobalt in Russia. SUAL (which operates facilities in Northwest Russia, as well as in the Urals and Siberia) and Metallurg (comprising the Volgograd Aluminum Plant in the Volga region) are respectively second and third in Russia in aluminum production, after Russian Aluminum holding (RusAl), and together provide over 20% of the country's output.

Other companies hold lesser positions in the industry. Some of them own assets outside the metallurgy and metal-working cluster (for example, MDM Group). The sector is also characterized by substantial participation of offshore capital. There is practically no capital from developed countries invested in these industries in Russia.

When comparing the two main sub-sectors of the cluster, it is obvious that the degree of asset consolidation is higher in non-ferrous metallurgy

Figure 6.5 Structure of Ownership in Northwest Russia: Non-ferrous Metallurgy and Metal-working



and metal-working. As was noted earlier (see Section 3.5), this is typical not only for the Russian metallurgy and metal-working cluster, but for the world as well.

Completion of the main stage of property redistribution in the cluster should be viewed as a positive trend. Company owners now have the possibility to address the strategic issues of development and planning, since the industrial potential inherited from the Soviet period has been almost totally depleted. The desire of many leading companies to raise production efficiency comprises not only of equipment modernisation, but also the strengthening of vertical integration.

Apart from integration, large companies have also started to diversify their businesses. For example, Severstal acquired controlling stock in the Ulyanovsk Automobile Plant and in the Zavolzhsk Motor Plant (both located in the Volga region), though they consume together less than 1% of the total Severstal output.

Finally, another important trend should be noted: industry leaders have started developing projects for major new production facilities, although this process is only going ahead in the aluminum industry.

However, apart from positive trends, there are also negative ones. One of the most important concerns the major difficulties faced by companies with restructuring and workforce reduction. Over the last 20 years, world industry leaders implemented large-scale restructuring and cut the

number of personnel by several times, while, in Russia, over the same period, the workforce decreased only by 11%.

Box 6.3 'Aluminum Fever' in Northwest Russia

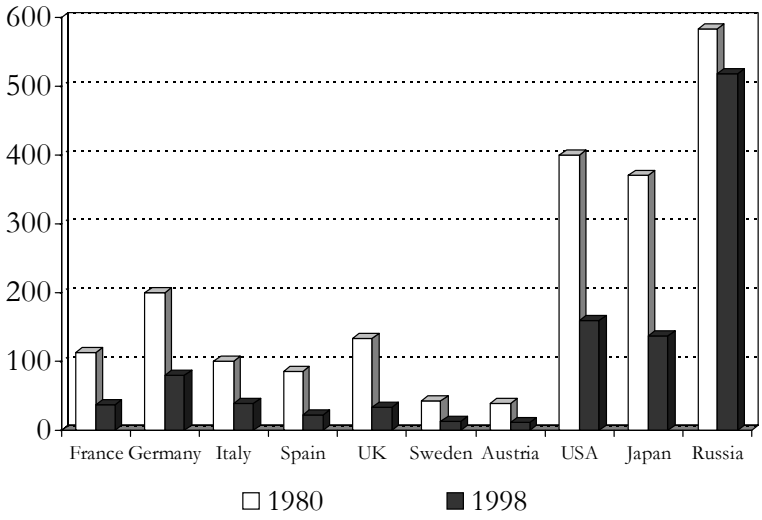
At present, there are three aluminum plants operating in the region, with an annual output of about 160,000 tons of primary aluminum (about 5% of national production). An advantageous geographical location, developing infrastructure and the presence in the region of excessive electric power capacities form the basis for expansion of the sector and construction of new aluminum plants.

Currently, there are several ambitious projects being implemented or under consideration in this field:

- Construction by SUAL Holding of an alumina plant with a project capacity of 1 million tonnes per year, on the basis of the Timan bauxite deposit, with further development of modern aluminum production facilities with a planned annual output of 500,000 tons. Estimated cost of the project amounts to USD 2.4 billion. At present, an international team of experts is completing the feasibility study commissioned by the holding.
- Production of high purity aluminum at the Volkhov Aluminum Plant. At present, negotiations are proceeding with Pechiney (France) on the purchase of USD 6-8 million worth of equipment, in exchange for fixed-price futures contracts of aluminum supply. Estimated output of the facility will be 20,000 tons per year.
- Construction in the town of Koskolovo (in the Leningrad region) of a primary aluminum plant with an annual capacity of 180,000 tons, with a total project cost reaching USD 700-800 million. The project was initiated by the American company Alutec Corp. The new plant will be powered by the Leningrad Nuclear Power Plant (LNPP) at rates from 0.8 to 1.15 cents per 1 kW/h, in exchange for advanced financing of the reconstruction of the first LNPP power block, in the amount of up to USD 100 million.
- Construction of the Vsevolozhsk Plant of Rolled Products, based on the facilities of former plant Russian Diesel (in the Leningrad Region). This project was initiated by Russian private companies and is estimated at USD 130 million, with a planned annual output of 45,000 tons of primary aluminum and 80,000 tons of semi-processed products, including alloy rolled products, sectioned and corrugated plates, slabs and other products. This project has been heavily criticized for its environmental risks.
- Russian Aluminum Holding has declared its intention to construct a primary aluminum-production plant with an annual capacity of 300,000 tons and an investment of USD 900 million in Kola Peninsula. At present, the project is in its preparatory stage.

The key problem faced by all these projects is the future cost of electric power. Currently, metallurgy enterprises have an opportunity to regularly renew their agreements with energy companies that secure beneficial tariffs, but this situation is not guaranteed to last forever.

Figure 6.6 Dynamics of Employment in Metallurgy Industry in the World, Thousand People



Source: Machine-Building Metallurgy, No. 1, 2001

Russian regional authorities strongly resist any attempts by companies to cut personnel, because of the important social role played by large metallurgy enterprises. Drastic cuts in the workforce in remote towns, where there are no other employment opportunities and small businesses and services are underdeveloped, would seriously undermine the social climate and could even lead to large-scale conflicts.

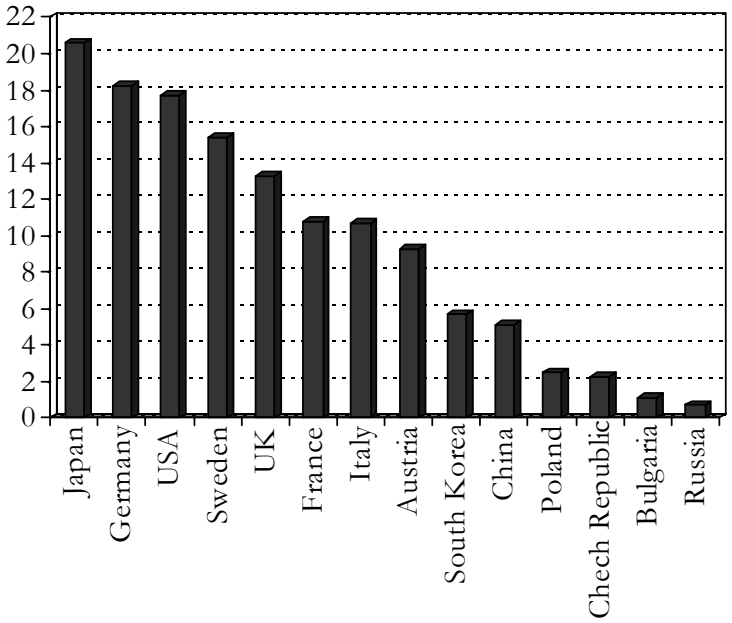
In developed economies, redundant workers have the opportunity to acquire new skills and find employment in other sectors of the economy, mostly in the services sector. However, this sector can only develop when the level of salaries can afford these services, while, in Russia, salaries and purchasing power of the population are still very low. That is why, in most locations (apart from St. Petersburg and Cherepovets), these services cannot serve as a social remedy and absorb laid off employees.

As a result, Russian metallurgy and metal-working companies retain an excessive workforce (and pay social infrastructure costs), possible because of the existing low level of wages, which is furthermore one of the main factors of price competitiveness by Russian industries in the world market.

Apart from the social burden, there are two other negative factors inherited from the Soviet period. First is the continuing absence of competition in the domestic market (while, in international markets, Russian companies are rivalled by their counterparts from developing countries),

and second is the ongoing neglect of environmental pollution. Companies declare their concern to reduce emissions, but do not undertake any significant actions.

Figure 6.7 Average Hourly Wages in Metallurgy Industry, USD



Source: International Metal Workers Association, Annual Survey 2000

Table 6.4 Productivity of the Metallurgy Companies

Company	Country	Turnover/Employees, USD
Magnitogorsk Metallurgy Plant	Russia	48,003
Severstal	Russia	40,510
Novolipetsk Metallurgy Plant	Russia	26,032
Cherepovets Steel Rolling Mill	Russia	24,557
Rautaruukki	Finland	190,469
Imatra Steel	Finland	130,146
Bethlehem Steel	USA	254,503
NKK	Japan	361,755

Source: data provided by the companies, 2001

As to productivity, it remains considerably lower than in developed countries. An absence of investments from developed countries in the cluster makes it difficult for the Russian companies to acquire best practices.

A high proportion of 'grey' transactions take place in the cluster even now. Businesses are characterised by very low transparency. In particular, company strategies are publicised in very general terms, while information on enterprises' Internet sites is very poor, covering only basic marketing data, such as price lists and brief company profiles. Information on current production and financial indicators rarely leaves corporate headquarters, and is regarded as confidential – despite the fact that open joint-stock companies must publish their annual figures in open sources of information, in accordance with current legislation.

To sum up, it can be stated that companies in the metallurgy and metal-working cluster are still in the transition stage: they still retain features inherited from the past, as well as new features gained during the economic transition period. Ownership change by itself does not mean very much. Competitiveness will only improve when new owners define the new rules of the game and pay much more attention to the issues of efficiency and effectiveness in their businesses.

6.4 Related and Supporting Industries

Sufficiently developed supporting and related industries are necessary to enhance the competitive potential of industrial clusters.

During the Soviet period, related and supporting industries of the metallurgy and metal-working cluster developed in accordance with the principles of the planned centralised economy. During the last decade here, as in other elements of the cluster, radical changes took place as a result of the overall transformation of the Russian economy.

Producers of metallurgy and metal-working equipment have suffered serious problems in the new economic environment. Their domestic market shrank, while their export potential, compared to metallurgy, was quite limited due to the low competitiveness of Russian equipment in developed markets. In addition, the technological lag is widening, since the level of investment in production-equipment modernisation is much lower than even that required to maintain the existing level of competitiveness.

As a result, export trade in Russian metallurgy and metal-working equipment has been limited to irregular orders from developing countries, where a number of plants were built with Soviet assistance and mostly equipped by Soviet-made facilities. In the domestic market, demand is mostly a result of the partial modernisation and maintenance implemented by a number of metallurgy companies over the last few years. Still, the volume of demand is minimal compared to the Soviet period.

In the future, prospects for equipment producers rely on improvements in the investment climate. Without major funds flowing into the industry, aimed at radical production modernisation, the situation will not improve. Otherwise, the Russian metallurgy and metal-working equipment industry's competitiveness will continue to fall, and its market share will inevitably be taken over by foreign companies.

High energy requirements of metallurgy technological processes make companies of the cluster highly dependent on supplies of fuel and energy. In the foreseeable future, no substantial decrease in energy consumption is expected. Under these conditions, the following issues become especially crucial for Russian companies:

- Collaboration with suppliers of fuel and energy;
- Development of their own energy facilities;
- Reduction in energy consumption by stricter technological control and introduction of energy-saving technologies.

The ongoing reforms in the Russian energy sector are of crucial importance. At present, state monopolies retain the gas industry, while the electric power sector is undergoing partial privatisation: generation and sales sub-sectors are being sold to private owners. These reforms will determine whether the relatively low energy tariffs (compared to developed countries) will remain one of the factor of price competitiveness of Russian metal products.

Speaking about energy tariffs (and other Russian tariffs on the whole) it is necessary to state that the tariffs system is not transparent. Some producers who have good contacts with key managers in electric power

Table 6.5 Electric Power Tariffs for Industrial Consumers on Average, US cent/kWh

Country	1998	1999	2000
Russia	2.55	1.2	1.4
CIS			
Ukraine	4.1	3.0	2.3
Armenia	3.8	3.5	3.2
Kazakhstan	4.1	2.5	2.1
Other			
USA	4	3.9	4
Brazil	5.7	5.6	5.5
Germany	6.8	5.6	5.4
UK	6.5	6.4	5.5

Source: International Energy Agency, Electricity Information, 2000

utilities are capable of getting considerable discounts. The other (foreign players – very often) must pay without any preferences. The starting conditions for various players are different.

Companies are already trying to diminish their dependence on the fuel and energy monopolies. The most vivid example is the action of Severstal, which took control of the majority of the coking coal deposits in the Pechora coal basin (in the Republic of Komi). Even though extraction of coal in this deposit is currently unprofitable, it is the closest source of high-quality fuel for Severstal, and has strategic significance for the company. Another important possibility will surely be the construction of electric power generation facilities within metallurgy companies to secure lower energy prices in the future.

Compared to enterprises in other regions of Russia, companies in Northwest Russia have the advantage of being located close to major seaports, but logistics issues will be important for them as well. At present, Russian transport logistics are quite inefficient and are characterised by delays, losses of cargoes en route, lack of specialised and general-purpose vehicles (primarily, railway carriages), deteriorating warehousing facilities, etc. Most of this is connected with the State monopoly on railways, which are the most important means of transportation for the metallurgy and metal-working cluster. Companies' managers almost unanimously complain about growing tariffs, low quality of transport services and absence of any alternatives.

At the same time, the tariffs for railway transportation in Russia are still much lower than those in Western Europe, and constitute another important factor for the price competitiveness of the Russian products. Moreover, the largest exporters regularly agree on lower tariffs for their cargo, but this cannot be regarded as a long-term factor of competitiveness. After reforms in the railway monopoly are undertaken, already discussed in the government, the situation obviously will change.

A positive aspect in the last few years is the development of certain elements in the transport system of Northwest Russia, first of all, the construction of new seaports, which will be used for metal cargo, for example, the metal terminal in the Ust-Luga seaport in the Leningrad region.

Because of the high metal consumption of most Russian enterprises, collection and processing of scrap metal could provide an important source of cheap and high-quality secondary raw materials for metallurgy. However, over the last decade, after the State monopoly on scrap-metal collection was abandoned, this sub-sector still cannot function efficiently under the new economic conditions. Scrap-metal businesses are charac-

terised by low transparency and high levels of related crime. Most of the scrap metal collected (its volumes fell drastically compared to the Soviet period) is exported, including illegal non-ferrous metal exports. This is due to both the difference in domestic and world prices, and low efficiency of regulation and law enforcement in this sphere. Since this problem is of major importance for the future of the metallurgy and metal-working cluster, it is described in detail in a specific study in Appendix 3.

Development of the metallurgy and metal-working cluster is also hampered by the weakness of Russian banking, financial and industrial insurance services. These sectors are still very young: during the Soviet period, all of these functions were monopolized by the State, and their development in the 1990s was very unstable.

Russian banks still do not have the capability to credit long-term projects requiring high volumes of investment, owing to low capitalization. The cluster's companies therefore have to rely on their own resources to undertake large-scale investment projects. The underdeveloped Russian insurance business and the stock market also undermine opportunities to obtain additional financial resources. In particular, the deficiencies of current legislation, on the one hand, allow for infringements upon the rights of minority investors and, on the other hand, allow for the use of minority investors in the process of an acquisition of assets by outside players (see Appendix 2 for more detailed information).

Business consulting and information services are only making their first steps in the metallurgy and metal-working cluster. As a rule, outside consultants currently participate only in projects with foreign companies. The level of information-technology penetration at the enterprises of the cluster is still much lower than in the advanced economies. IT systems are introduced only in a few production, accounting and management departments, while integrated production and management systems typical for Western enterprises are being introduced very slowly, since their full-scale use requires complete restructuring of all business processes.

Even less developed are corporate information systems. However, there are positive changes noted in this sphere, and the leading enterprises, for instance, have started to recognise the advantages of the international electronic trade.

Another example of the Soviet period's negative legacy is poor environmental protection. Metallurgy enterprises remain the biggest polluters in Russia. The most dangerous and hazardous (health wise) locations are the towns around such enterprises – Cherepovets as an example. Environmental protection services are currently carried out by own departments of the enterprises. Usually this results in underreporting or falsifying

environmental data related to pollution. A system of independent environmental services is not yet developed in Russia, while the State virtually ignores the existing grave situation, because the biggest polluters are at the same time the biggest exporters and, consequently, the biggest taxpayers.

Thus, at present, it can be stated that the complex of related and supporting industries of the metallurgy and metal-working cluster is also undergoing deep restructuring in the process of transition from centralized planning to the new economic environment. It should be noted that the majority of supporting and related industries also require large investment for their development, which is not possible without radical changes in the overall investment climate in the Russian economy.

6.5 Government

In the 1990s, the majority of Russian metallurgy and metal-working enterprises (including all the successful companies) were privatised, which inevitably led to the reduction of State influence on the development of the cluster. Still, this influence is considerable even at present, which is primarily explained by a high level of interest by the State in the industry, which is the second (after the energy cluster) greatest source of tax revenues.

The State has retained a number of instruments through which it can influence the activities of the companies of the cluster, including the following:

- Tax and customs policies;
- Regulation of tariffs on the products and services provided by the natural monopolies controlled by the State (railways, natural gas, electric power);
- Protection of Russian exporters in international markets.

The current tax policy can hardly be regarded as rational. In fact, the state takes advantage of the export patterns resulting from the August 1998 financial crisis in order to 'drain' resources from the exporters. This policy, however, does not take into consideration the need for large investment into modernisation of production facilities, as well as the need to develop the banking sector, which could provide the cluster with the necessary loan funds. As a result, companies have to resort to various measures aimed at concealment of their profits from taxation, given that current legislation has a lot of inadequacies and loopholes that allow such measures to be successful.

Customs policy is highly volatile, and the rules are often changed by authorities in order to pursue temporary benefits. Fluctuations of customs tariffs and duties are almost never coordinated with fluctuations in market prices, while some temporary privileges granted to certain companies cannot be viewed as a long-term development factor, because they are dependent upon personal contacts between top managers and governmental decision makers. The permanent problems with customs clearance of foreign trade also hamper over-the-border cooperation, which is crucial for the industry in Northwest Russia, where there are natural opportunities for such cooperation, for instance, with Finnish manufacturers and consumers of metal products.

One of the main problems concerning investment climate is still a very poor protection of investments both foreign and domestic. In authors' opinion, better investment protection laws and agreements are necessary in order to attract much more foreign direct investments.

The problems between companies of the cluster and State monopolies have already been discussed in this paper. At present, the situation in this sphere is ambiguous. On one hand, tariffs are rather low (compared to advanced economies) and provide price competitiveness of Russian products. On the other hand, their steady growth (not accompanied by any change in the quality of the services) seriously diminishes the company profits. Despite the gradual process of restructuring the monopolies, the State wishes to retain strategic control over all basic infrastructure, including the railway system, major pipelines and electric power transmitting lines. All above facts lead to the conclusion that the dependence of the industry on the tariffs set by these monopolies will stay for a considerable period of time. Thus, the situation with tariffs regulation should be regarded as a major factor of business instability in the long term.

The sharp increase of Russian metal exports over the last decade forced many countries to protect home producers from dumping. The measures introduced include quotas on metal-product imports from Russia, prohibitive customs duties, stipulation of minimal prices for certain national markets, etc. According to 2001 data, the largest number of such limitations were introduced by EU countries (15) and the U.S. (13). Trade sanctions against Russian price dumping were also used by a number of developing economies, including India, Argentina, Brazil, Egypt, Indonesia, and even Ukraine. These sanctions primarily concern products of ferrous metallurgy. Non-ferrous markets enjoy higher demand, but they are also influenced by some limitations in international markets.

The Russian government undertakes some measures to protect domestic exporters. Yet active measures are hampered by the fact that Russia still has not joined the World Trade Organization, and the Russian government has to resort to separate bilateral agreements, which do not provide sufficient protection for Russian producers. The government also sometimes introduces demonstrative measures, such as a ban on imports to Russia of American chicken meat, which was a reaction to severe measures against Russian metal products in the U.S. Such actions cannot be regarded as effective.

There are a lot of things to be learned by the Russian regulation authorities as relates to the effective measures of supporting domestic manufacturing. Much more emphasis shall be put on the indirect measures, and improving infrastructure and operating environment. The Russian exports are not supported by government export guarantees, either. The companies are not even provided with basic information, marketing and consulting services related to international trade. There is no comprehensive system of incentives to develop export trade. All this substantially undermines positions of the Russian metal producers in international markets.

On the whole, it must be stated that the main characteristic of the role currently played by the State is the absence of a coordinated industrial and foreign trade policy aimed at the effective production development. So far, the policy of the government has been mainly declarative and has lacked actions capable of bringing long-term positive consequences.

7 Conclusions

The preceding chapters of this paper were devoted to the analysis of the main competitiveness factors of the metallurgy and metal-working cluster in Northwest Russia. In this part of the study we present concluding remarks related to the current stage of development of the cluster and provide some views of its future trends.

First of all, metallurgy – and, to a much smaller extent, metal-working – are at present among the most important industries in Russia. It is second in both production output in monetary terms, and in volume of exports. In Northwest Russia, the relative importance of metallurgy is even bigger. These industries are the largest in this area.

At the same time, it must be noted that the underlying factors of the present success were established during the Soviet period. They include the raw materials base, production facilities, infrastructure and human capital. Over the last decade, this potential was heavily exploited, but there were almost no measures taken aimed at its development. As a result, the competitiveness of the cluster has been steadily declining.

The most significant negative factor for the cluster during the transition period was a sharp decrease in domestic market, resulting from a deep recession in the machine-building industry (especially in the military complex which, during the Soviet period was the biggest consumer of metal products), as well as a major decline in the construction industry. Producers of high added value products were most heavily affected. In developed countries, the cluster develops from primary towards secondary metallurgy and metal-working, while, in Russia, the trend so far has been the direct opposite.

The main source of competitiveness for the Russian metallurgy cluster, the low price, is still based on relatively cheap energy and transport tariffs and the low cost of labour compared to European countries. However, these factors cannot be considered sustainable in the long term.

The only example of an obvious competitive advantage is the uniquely rich copper, nickel and platinum ores of the Norilsk deposit which locates in North Siberia. This advantage, however, only involves the non-ferrous metallurgy sub-sector and, for that matter, only the processing enterprises of the Norilsk Nickel holding. In Northwest Russia, these include Severonickel and, to a certain extent, Pechenganickel.

Thus, in order to maintain or enhance the competitive potential of the metallurgy and metal-working cluster, right now extensive improvements are required. Over the last decade, such measures were clearly insufficient due to the poor investment climate. Although the last few years were characterised by certain improvements, the overall investment prospects are still unfavourable and unstable. Changes for the better seem possible only with resolution of the following main problems of the sector:

1. State regulation

The State's role in the development of the cluster will most likely not diminish, due to the large revenues and resulting strategic importance of the metallurgy sector for the national economy. At present, the influence of the state is, on the whole, rather unbalanced and spontaneous.

For effective development of the cluster, it is necessary to create a targeted industrial policy aimed at assisting not only the metallurgy industry itself, but also the whole complex of supporting and related industries, and also the main consumer of metal products, the machine-building sector.

In the sphere of foreign policy, the greatest influence will be the entry of Russia into the WTO. According to estimates, it should occur no earlier than 2005. It will give Russian exports stronger protection on the world market, as well as increase competition in the Russian market. All of this would certainly serve as a major incentive for more efficient production of the domestic companies.

There are several issues concerning Russia's future WTO membership. First of all, these are standards and certification. Russia should reach the same industrial and infrastructure standards as the EU. Besides, the procedure of certification should be simplified and the products certified in the EU should be accepted in Russia, too.

Another important issue – obligatory liberalization of Russian export and import taxes. According to Russian experts, the reduction of export taxes will increase Russian exports of raw materials and scrap metal due to discrepancy between domestic and world prices. On the other hand, reduction of import taxes will strengthen competition in the domestic market due to substantial imports growth.

The State could also play an important role in the development of infrastructure and initiatives aimed at integration of Russian companies into the global metallurgy and metal-working industries, by means of the introduction of IT systems, harmonization of customs and trans-border trade procedures, standardization of accounting systems, etc.

As regards attracting foreign investments, the key point is a creation of effective protection of investments including federal and regional laws and bilateral agreements with countries, which show the most interest to invest in Russia – Finland, Germany, Sweden, the USA and some other.

2. Development of infrastructure

The development of the transport and supporting service industries – finance and banking, insurance, business consulting and IT – in Northwest Russia is now clearly insufficient for sustainable development. The transportation network in the main raw material producing areas is quite sparse, and does not facilitate effective development of remote ore deposits. The underdeveloped banking, finance and industrial insurance sectors prevent companies from attracting the substantial investment required for implementation of major new projects. IT utilization is even worse, both in internal corporate applications and wider communication networks.

In the future, infrastructure development will inevitably require action by both the industry and the government. So far, companies have been able to complete only relatively modest projects on their own - such as development of a railway link from the main railway line to the Timan bauxite deposit, or introduction of a corporate IT network within an enterprise, etc. Wider-scale transportation projects – such as the construction of the Belkomur railway line – as well as the development of the banking, finance and insurance systems, will require the participation of the State.

3. Restructuring of companies

Despite the changes in ownership that took place in the 1990s, most of the companies in the cluster still suffer from Soviet legacy: excessive personnel and high social costs. In addition, over the last decade, the structure of the companies became even more complicated. All of these factors developed against a highly criminal background and virtual absence of rules of the game. As a result, the transparency of business processes is still very low. Sales and marketing are the least efficient.

A decrease in criminal activities and an increase in business transparency are currently the most pressing challenges. Completion of ownership redistribution and development of strategic planning at most companies encourages the prospect that these problems will gradually be solved.

The problem of restructuring is closely related to the quality personnel. So far, companies have preferred large numbers of underpaid staff, since, for the current production quality, there is no need to invest in

training. Still, even now, companies suffer from deficiencies in qualified personnel, especially in such new spheres as marketing, IT, etc. In the future, if the prospect of products with higher added value gains momentum, the quality of human capital will become significant for most companies. Resolution of this problem will require wide cooperation with education of all levels, as well as a substantial increase in compensation packages.

4. Modernisation of facilities and R&D

Over the last few years, modernisation of production facilities has been carried out rather actively in a number of enterprises of the cluster. Yet the overall technical standards of production are by far inferior to those of developed economies, and this gap has not been diminishing to any degree. Most products are still produced at large, highly-specialised facilities that cannot react quickly to changes in demand. The metallurgy and metal-working potential of departments of major machine-building companies in St. Petersburg, which could function as flexible and effective mini-plants, is presently only used to a small extent, due to low domestic demand for high-technology metal products.

Considerable incentives for a more intensive and, more importantly, wider modernisation at enterprises in the cluster, could be achieved through a revival in the machine-building sector (resulting in higher demand for products with higher added value) and a sharp increase in environmental enforcement by the state.

Similar conditions are required for the development of the cluster's R&D. Over the last decade, its potential was almost not utilized at all, which led to its notable decline. Now, companies planning to undertake major projects, face low quality domestic R&D, and turn to foreign firms in order to gain knowledge of their facilities and needs. In order to restore and develop the previous high potential of R&D, substantial investment is required in the near future. However, this is not to be expected while the economy is developing in accordance with a raw materials, and not innovation, scenario.

5. Energy and transport

In terms of such essential components of the value system as energy (fuel and electric power) and transportation (railways), companies in the cluster are still highly dependent on tariff policy and low efficiency of the State monopolies. The biggest problem is that the current system makes current conditions for various players different – that concerns especially foreign players.

When the current restructuring of the electric power monopoly and the planned restructuring of the gas industry take effect, a competitive energy market is expected. However, since the State is planning to retain overall control of the basic infrastructure of these sectors (railway system, electric power transmitting lines, pipelines), the outcome of these changes is hardly possible to estimate.

Because the tariffs for transport services and electric power will inevitably grow, the development of own power-generation facilities, organisation of own transport services and the use of alternative methods of transportation (inland waterways), are all measures that will taken by the companies aiming at long-term cost reduction. As for the capacity of existing electric power plants in Northwest Russia, it is in the short term sufficient for the existing industry – the reserve capacities of the two nuclear power plants of the region even allow for the construction of new large aluminum facilities in their proximity. Still, the output of the power plants is offset by an underdeveloped transmittion network. Most of these power plants are depleted and will have to be modernized or shut down in the medium term. This will result in substantial changes in allocation of facilities. Thus, on the whole, there are considerable future energy risks for companies in the cluster.

6. Use of secondary raw materials

Today, the use of primary raw materials (ore) by far exceeds the use of secondary raw materials (scrap metal). Compared to the Soviet period, scrap materials collection has sharply decreased and, over the last decade, this sub-sector has been the least efficient and contained the most criminal elements of the cluster.

At the same time, the high level of metal consumption which characterised the Soviet period, as well as the high degree of equipment wear in all sectors of Russian industry today, create extensive reserves and opportunities for the future use of secondary raw materials. Here, the main problem relates to the establishment and enforcement of regulations that would benefit the development of the secondary raw materials market. These issues are not currently adequately addressed, because of the complexity of supervision of a large number of small companies working in this sphere, and a high level of corruption in the relevant bodies of state power.

7. Environmental protection

The overall decline in industrial emissions that took place in the 1990s, compared to the Soviet period, resulted from a recession in the industry,

and not from more efficient environmental protection measures. The growth in industrial output after the financial crisis of 1998 once again led to an increase in environmental emissions. At present, the State, in fact, encourages the industry toward more emission, because it does not, in any way, limit the levels of contamination, which are several times higher than compliance standards in developed economies. This is especially relevant for the metallurgy and metal-working cluster, because it has traditionally been the largest polluter of all industrial sectors. In Northwest Russia, a number of the cluster's enterprises that are located near the border (Karelsky Okatysh, Kovdor GOK, Pechenganickel) may also pose environmental threats to neighbouring countries.

Radical changes are only possible through adoption of effective environmental legislation in Russia, stipulating a rigid system of environmental charges and other relevant sanctions. Only then, will companies be motivated to introduce clean technologies and take other costly measures aimed at minimising harm to the environment.

Vision

To summarize this review of the current investment climate, the authors argue that, under continuing political instability, Russia should not expect fast positive changes. The economy's transition period has already taken a long time, and its short to mid-term prospects are, on the whole, mildly positive. Further progress will be slow. For the next decade or two, the main features and trends that will characterize the development of the metallurgy and metal-working cluster in Northwest Russia will be the following:

- Retention of a high level of government control over the cluster's development;
- Growth in domestic consumption, primarily due to development of the construction industry and infrastructure renovation, including replacement of a large number of pipelines of various types, railway tracks, etc.;
- Retention of a low level of non-ferrous metals consumption;
- Retention of a low output of the domestic machine-building industry, excluding some enterprises of the military sector;
- Retention and possible further specialisation of Russian companies in raw materials and low added value products in the international markets;

- More active competition with producers from developing economies in the international markets;
- Entry of Russia to the WTO, which, on the whole, will create more favourable conditions for export trade;
- Further high dependence of the cluster on the world market price trends;
- Growth in imports of metal products with a higher added value;
- Increase in transparency of Russian businesses;
- Further diversification in activities of the key players in the cluster (Severstal, Norilsk Nickel);
- Development of partnerships with major international metal-working and machine-building companies, where Russian companies will provide primary products for further processing;
- Penetration of the cluster by new foreign players;
- Implementation of new primary aluminum production facilities;
- Substantial increase in the output of metal products intended for the consumer market: foil, aluminum beverage cans, household utensils, etc.;
- Gradual development of a metal-products sales network, operated by major metal producers;
- More intense modernisation of production facilities, primarily with imported equipment;
- Further exclusion of domestic metallurgy-equipment producers from the market;
- Further deterioration of the R&D potential of the cluster;
- Retention of relatively low salaries and excessive numbers of workers at large enterprises;
- More active cooperation between companies of the cluster and educational institutions, especially the system of secondary technical schools;
- Further dependence of the enterprises on regulated tariffs on railway transportation, natural gas and electric power;
- More extensive use of secondary raw materials, resulting from administrative enforcement or export bans on scrap metal, as well as from cooperation between metallurgy companies and enterprises specialising in scrap metal collection and processing;

- Slow but steady development of domestic financial, banking and insurance systems, while the largest companies will continue to use the services of international leaders;
- More intense introduction of information technologies at the more successful enterprises of the cluster;
- Retention of a high level of environmental emissions by cluster enterprises, several times higher than in Western Europe;
- Further specialisation of the Kola-and-Karelia agglomeration in primary non-ferrous metallurgy;
- Reorientation of Severstal toward raw materials from the Kursk iron-ore deposits;
- Retention of Severstal's dominate position in the Northwestern agglomeration;
- Creation of a new metallurgy agglomeration in the Republic of Komi.

In conclusion, it must be emphasized that this forecast is based on the premise that the liberal reforms initiated in Russia in the 1990s will be continued without any radical alteration from their present direction. In addition, there are a large number of subjective factors that have traditionally influenced economic development in Russia - low level of law enforcement effectiveness, great importance of personal contacts between top managers, varying mentality of different groups of the population, poor business ethics, etc. - which resist accurate economic evaluation but, which, under certain conditions, may greatly influence the process of economic development.

Appendices

A1. Structural Changes in the Russian Domestic Metal Product Market

The structural changes that have happened in the Russian economy over the last decade have had a major impact on the development of domestic metallurgy industry. The sharp decrease in domestic consumption of metal products, the fall in production output and re-orientation of metallurgy towards export sales in early 90s have defined the current state of the Russian market. This study is aimed at outlining the main trends observed in the domestic market of ferrous and non-ferrous metals after the collapse of the Soviet Union, as well as at analysing the links between the structural changes in the domestic market and competitive power of the Russian metallurgy industry.

Ferrous Metallurgy

After the collapse of the USSR, Russia was left with a ferrous metallurgy sector that was one of the world's leaders in terms of output volume. The USSR output volumes have not yet been exceeded by any other country in the world. In 1990 the USSR consumed 18% of world steel products, with per capita consumption amounting to 404 kilograms per person, which by far surpassed the average world level of 127 kilograms per person. However, after the collapse of the Soviet Union, absolute and relative metal consumption quickly declined (see Fig. 6.2), and this process was especially typical for Russia, where within the period of 1992-1998 domestic consumption fell by 2.9 times, and in 2001 reached a modest 154 kilograms per person.

A distinguishing feature of Soviet ferrous metallurgy was the large share of output provided by giant enterprises. Russia inherited 8 such major integrated enterprises - Severstal, Magnitogorsk Metallurgy Plant, Nizhny Tagil Metallurgy Plant, ZapSib, Novolipetsk Metallurgy Plant, MeChel, NOSTA and Kuznetsk Metallurgy Plant – which in 1999 provided 82.7% of the ferrous metallurgy output in the country. The privatisation of State enterprises led to a virtual war for valuable assets of these enterprises, which inevitably resulted in a destabilization of the overall situation in the industry and a decline in production output. A significant role was also played by the break-up of cooperation with enterprises of the former republics of the Soviet Union. Yet the main cause for the de-

crease in production volumes was the crisis in the main metal consumers, primarily in heavy machine building and the military complex.

In the conditions of a sharp decrease in domestic consumption, the enterprises had to reorient their sales strategies toward the export trade. Despite the fact that over the last few years the share of exports has been steadily declining, 55% of Russian ferrous metallurgy products are currently sold for export, and it is products with a low added value that are most competitive due to their low production costs, and therefore account for the biggest share of export sales. In 2001, 60% of ferrous metallurgy exports was raw materials and semi-processed products (ore, scrap, coke, pig iron, slabs, billets, ingots, etc.).

The export orientation of the Russian metallurgy resulted in significant changes in the production range structure. Compared to 1990, in 2000 the output of iron ore decreased by 23%; coking coal by 37%; pig iron by 33%; steel by 52%; rolled metal by 36%; and steel pipes by 2.48 times. The same is true for the metallurgy sector of Northwest Russia:

Table A1.1 Output of Basic Ferrous Metal Products in Northwest Russia, Thousand Tons

	1990	2000
Iron ore	20,998	14,153
Coke	5,662	4,088
Pig iron	9,535	7,587
Steel	13,342	10,222
Rolled metal	10,922	8,662
Steel pipes	406	283

Source: Goskomstat (Russian State Committee for Statistics), 2001

It is obvious that the rate of decline in the output of steel, rolled metal and, especially, steel pipes was much higher than that of iron ore and pig iron. This shows that the production structure of the sector deteriorated and that the share of low added value products increased significantly. This is also supported by the lower rate of utilization of specific production facilities, namely those designated for the production of steel, rolled products and pipes – see Table 6.1.

Demurrage and the high level of wear and tear of production facilities, which in early 2001 was estimated by Russian experts at 53%, are aggravated by the slow process of modernization of equipment and introduction of modern technologies. Despite the fact that in the period between 1990 and 2000 the share of open-hearth furnace steel decreased from 53.3% to 27.4%, while the share of continuous casting steel grew from

23% to 49.8%, the structure of Russian production is the worst among the biggest steel-producing countries of the world (the combined share of converter and electric steel in the world is about 95%, and the share of continuous casting steel is 85%). The low technological level of Russian metallurgy results in a considerable lag in a number of technical and economic indicators compared to the metallurgy industry in developed countries (USA, EU, Japan):

- average power consumption per unit of steel production – in Russia higher by 20 – 30 %;
- volume of metal waste in rolled stock production – in Russia 2 times bigger;
- average productivity – in Russia 2,5 – 3 times lower;
- total negative impact on the environment – in Russia substantially higher.

Degradation of basic assets and lack of investment into the development of new technologies led to a simplification and narrowing in the range of products of Russian metallurgy in 1990-2000. Thus, the share of alloyed and stainless steel decreased from 15.3% and 1.8% to about 8% and 0.3%, respectively. Moreover, after the collapse of the Soviet Union, Russia faced a deficiency in production facilities for certain product types, which had previously been provided by Ukrainian plants. This concerned sheet stripes with a width of 1,570-3,200 mm, thick steel sheets, special shapes, construction metal, various types of steel pipes, etc.

Absence of production facilities for advance technology products, especially special steels and alloys, threatens Russian metallurgy with the loss of the most profitable market segments, which could be occupied not only by Ukrainian companies, but also by their European competitors. Regarding the problem of import substitution, the production of large-diameter pipes used in gas pipelines is of major importance for Russian industry. Due to the large distances between large gas deposits and main consumers of natural gas in Russia, the demand for such pipes on the part of Gazprom is an important growth factor for Russian metallurgy companies.

It should be noted that growth in domestic demand is recorded not only for the pipes segment. Starting from 1998, domestic demand grew in virtually all ferrous metallurgy sub-sectors. In 2001, domestic consumption of ferrous rolled stock exceeded the corresponding figures of 1998 by about 50% and amounted to about 23 million tons.

Table A1.2 Major Consumers of Ferrous Metallurgy Products in Russia in 2001, Million Tons

Industry	Consumption
Machine building	11
of which automotive industry	2
Construction	3.5
Energy cluster	3
Railway transport	1.6

Source: Metallosnabzheniye i Sbyt Magazine, № 5, 2001

Due to the increase in domestic demand, in the period of 1999-2000 metallurgy was one of the leaders among Russian industries in production output growth, with a growth rate of 16.8% compared to the average rate of 15.7%. In 2001, the volume of production in ferrous metallurgy reached 59 million tons. Apart from the growth in domestic demand for metal products, this trend also resulted from more effective exports of metal products due to the devaluation of the rouble and a favourable situation in the world market.

At the same time, compared to 2000 the production output of ferrous metallurgy in 2001 remained stable (99.8 %). In the world market, Russian metallurgy enterprises faced a decrease in demand resulting from slower growth rates in the countries which are the major consumers of ferrous metals, a general decrease in world metal prices, as well as anti-dumping measures introduced against Russian products in a number of regional markets. Taking these restrictions into consideration, the prospects for development of Russian metallurgy are dependent on a growth in domestic demand. Despite the recent slower rates of growth in domestic demand for metal products, the potential for development has not been exhausted. The high level of depreciation of basic assets in virtually all metal-consuming industries, as well as in railroad transport, forces the enterprises to renew these assets, which creates opportunities for an increase in metals production.

Taking into account the technological lag of Russian ferrous metallurgy, its future competitiveness depends on whether the industry is able to develop in accordance with innovation patterns. This primarily requires completion of ownership restructuring and concentration of activities of metal companies on improving the production efficiency. At present there are a number of vertically-integrated holdings comprising companies in the full cycle of metallurgy production, from extraction of raw materials to production and sale of products. This type of vertical integration, as well as the integration of production companies with af-

filiated banks, results in consolidation of significant funds required for modernization.

In addition to the sphere of production, major importance is given to sales and distribution of metal products. In the Soviet period, sales of metals were planned from the centre, which resulted in established sales and distribution channels. During the transition period, this distribution system suffered major changes, and numerous metal distribution companies appeared on the market. At present, about a third of Russian ferrous metals are sold through distributors, while two thirds are accounted for by direct sales. By contrast, in Western countries the share held by distributors is significantly higher: up to 70% of the market in Spain, 65-70% in the countries of Benelux, 70% in Germany, 50-60% in Great Britain, and 45-55% in Italy. Moreover, developed markets are characterised by a network of service metal distribution centres providing supplies of small consignments of products with high added value, which guarantees higher service levels and stimulates domestic consumption.

In Russia this system is in its first stages of development, with metal sales companies offering a limited range of services with rudimentary IT support networks. However, metal sale and distribution should be considered a highly prospective sector, which can substantially motivate competition and increase domestic demand. This statement finds support in the increased interest in the sphere of sales and distribution on the part of major producers: Severstal, for instance, has started development of its own distribution network.

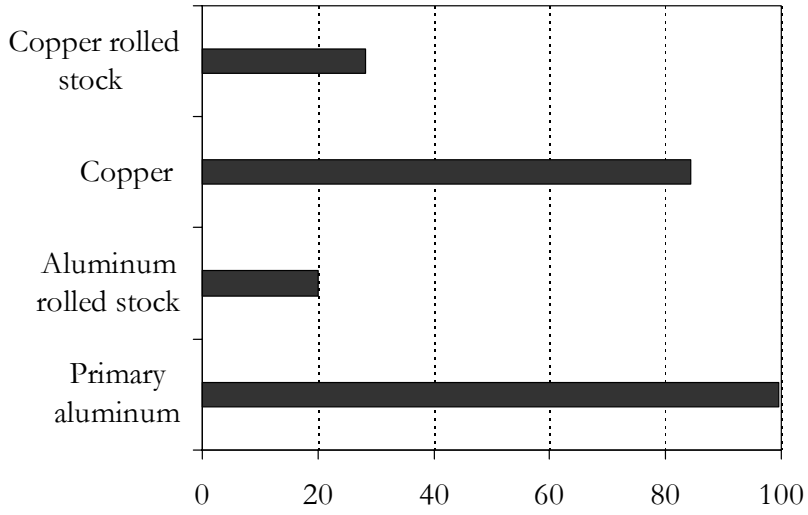
Non-ferrous Metallurgy

In 1990, the USSR held first place in the world in the output of nickel, titanium and magnesium; second place in aluminum, copper, lead and zinc. The country also was third in the production of wolfram and molybdenum concentrates, and was one of the top three world producers of gold, silver, platinum and rare-earth metals.

Decrease in domestic consumption of non-ferrous metals after the collapse of the Soviet Union was even greater than in the case of the ferrous metals market. Already by 1995, domestic consumption of aluminum, copper, lead and zinc fell by 2.3-3 times, tin by 4 times, and nickel by more than 5 times. While in the late 1980s domestic consumption of basic non-ferrous metals per capita was about 25 kilograms, by 1999 this figure fell to about 5 kilograms. Such a significant decrease in domestic consumption can be accounted for by the fact that the main consumers of non-ferrous metals (radio-electronic, aerospace, and transport machine-building industries) were more heavily influenced by the economic crisis than the industries consuming ferrous metals.

Prior to 1990, only about 25% of non-ferrous metals produced were sold for export, but now this share is about 80%. Over the period of 1991-1999 the volumes of Russian exports of aluminum increased by 3.6 times, of copper, nickel and zinc by 2.5, 1.9 and 4.9 respectively. It should be noted that both in ferrous and non-ferrous metallurgy, the structure of product ranges shifted towards products with a lower added value, which is supported by utilization rates of production facilities. Compared to 1990, in 2001 the output of semi-processed aluminum products was only 22%, aluminum rolled stock and foil – 23%, and construction components – 31%.

Figure A1.1 Utilization Rate of Production Facilities in 2001, %



Source: Metals of Eurasia, No. 3, 2002

However, Russia still remains the biggest world producer of non-ferrous metals: in 2001 it produced 12.9% of aluminum, 5.8% of copper, 22.2% of nickel. The export orientation of Russian metallurgy makes it directly dependent on the situation of the world market, which over the last few years has been characterized by an excess of demand for non-ferrous metals over their production. The decrease in international prices for non-ferrous metals threatens the profitability of Russian enterprises, since their outdated technologies and high level of amortization of basic assets prevent them from reaching the efficiency levels typical for advanced economies.

The rate of amortization of basic production assets at various non-ferrous metallurgy enterprises is within the range of 40-70%, while at a

number of aluminum plants it reaches the critical level of 75 - 85%. During the period of 1991-1998, the rate of modernization of basic assets of non-ferrous metallurgy was about 1.5%, while the minimum necessary rate is considered to be 4-5%. At present, the specific energy intensity of aluminum production in Russia is 20-30% higher than the average world level. Only 14-16% of Russian aluminum is produced with the use of burnt anodes technology, while in Western Europe this rate reaches 87%, in the USA 77%, and in Australia 100%. In copper and nickel production, oxyacetylene technology is used at a rate which is much lower than the modern level. Labour productivity in non-ferrous metallurgy is also below the average world figures.

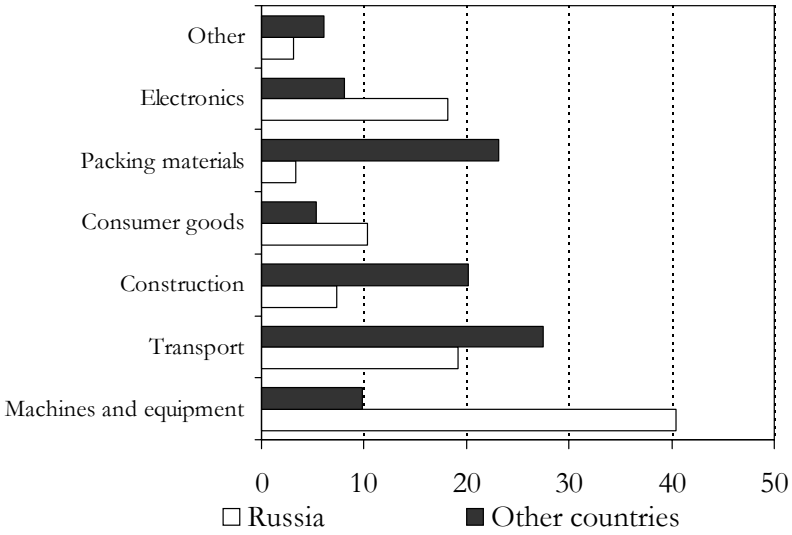
At the same time, Russian non-ferrous metallurgy enterprises do not have strong incentives for active modernization of production facilities and increasing their efficiency. Compared to ferrous metals, products of non-ferrous metallurgy are characterized by a much higher liquidity rate in the world market, which is why selling large volumes of primary non-ferrous metals is much more profitable than investing funds into development of production facilities for products with a higher added value.

Recent changes in corporate sector have greatly influenced the current situation both in ferrous and non-ferrous metallurgy. The history of the struggle for ownership in non-ferrous metals industry which took place during the 1990s is full of notorious scandals, and this is perhaps the most typical example of the peculiarities of the Transition period in the Russian economy. Yet by now the process of corporate transformations has resulted in establishment of a number of large vertically-integrated companies.

The Russian aluminum market is, in fact, divided between two companies, Russian Aluminum and SUAL Holding. Russian Aluminum at present controls about 70% of the Russian primary aluminum output. The holding comprises the Bratsk, Krasnoyarsk, and Sayany aluminum plants, as well as the Achinsk, Nikolayev (Ukraine), and Oradia (Romania) alumina plants. RusAl also controls the Samara Metallurgy Plant, the Belaja Kalitva Metallurgy plant (Rostov region), the Sayanskaya Folga plant, Armenal (Armenia), and a number of other enterprises, including GAZ, which is one of the largest Russian automobile plants. SUAL Holding is the second integrated company after Russian Aluminum and controls 20% of domestic aluminum production. It comprises the Nadvoitsy and Kandalaksha aluminum plants, Timan Bauxite, and a number of enterprises in the Urals and Siberia. Similar integration processes are going on in the copper industry, where the leader is Urals Mining and Metallurgy Company (UGMK). Russian production of nickel is almost totally controlled by Norilsk Nickel.

The domestic market is not so important for non-ferrous metallurgy, and its prospective growth in the nearest future is also not to be expected. A significant domestic consumption of non-ferrous metals is possible only after a significant increase in Russian GDP and the development of advanced technology industries.

Figure A1.2 Consumption of Aluminum by Industry, %



Source: www.cfin.ru

A serious problem for the development of domestic non-ferrous metals market is its inefficient structure: while in the Western countries it is evenly distributed among construction, transport and packaging industries, in Russia, the major share of aluminum is consumed by the machine-building industry. It is the development of new spheres of application of non-ferrous metals and furthering of structural reforms in the consuming industries that may create incentives for reorientation of non-ferrous metallurgy towards more advanced types of products. From this point of view, a good example is provided by the aluminum market.

Extensive opportunities for increasing the volumes of aluminum production output are based on the development of the vehicles production industry. The aluminum content in Russian passenger cars, according to different estimates, amounts to 30-40 kilograms, while the foreign vehicles production industry has chosen to create vehicles that are as light as possible: aluminum content in the motor cars has already exceeded 100 kilograms, and by 2015 it is planned to bring it up to 200 kilograms. Russia also has prototypes of private and public transport vehicles (trolley-

buses, trams), metro cars of a new generation, and a train for high-speed railroads, all of which are built on the basis of aluminum bodies. Serial production of products, however, requires large investments and is hardly feasible in the nearest future. A stimulus for the development of the aluminum industry may also be the reform of the aircraft building industry.

The market of aluminum packaging materials, whose volumes of production in Russia are as yet insignificant, offers substantial growth potential. Now, the biggest enterprise of this sector (Rostar plant owned by RusAl) has an output of up to 1.3 million aluminum cans. According to some estimates, in the future the Russian market may reach an annual consumption rate of over 6 billion beverage cans. Meanwhile, the world market of aluminum packaging is demonstrating higher rates of growth. The following figures may serve as a good example: the Russian market at present annually consumes only 7 aluminum cans per capita, while in EU countries and in the USA this figure is between 80 and 400 aluminum cans.

Another prospective market for aluminum producers is the construction industry (aluminum components are especially suitable in the regions of the Russian North), as well as the electrical engineering industry. Copper industry development may be boosted by the reform of RAO UES, which envisions massive renovation of equipment and electric power transmitting lines.

Conclusions

The above-described structural changes in the Russian metal market allow for the formulation of the following basic conclusions:

- in the early 1990s, a major decrease in domestic consumption of metal products took place: by 2-2.5 times for ferrous metals, and by 3-5 times for non-ferrous metals;
- the main reason for the decrease of domestic metal consumption was the deep crisis in the machine-building and construction industries;
- sharp decrease in domestic consumption led to reorientation of metal producers towards export sales of metal products;
- market changes caused changes in the structure of metals production towards products with lower added value;
- at present the restructuring of the market is taking place, including the establishment of new distribution networks and transfer from a

centralized system of distribution to competitive patterns, however, the competition in the domestic market is still not very high;

- prospects for the growth in ferrous metallurgy are primarily connected with the necessity for renovation of basic production assets in metal-consuming industries;
- for non-ferrous metallurgy, a substantial growth in domestic consumption is not possible in the short term, since it must result from a significant GDP growth and intensive development of advanced technology industries;
- in the period of the fall in domestic consumption, the export orientation of Russian metallurgy helped the enterprises to survive, but the only export sales cannot provide for the long-term competitiveness of the Russian metallurgy industry;
- the major competitive factor of metallurgy in the long term is the development of the domestic market and an increase in demand for high-technology products.

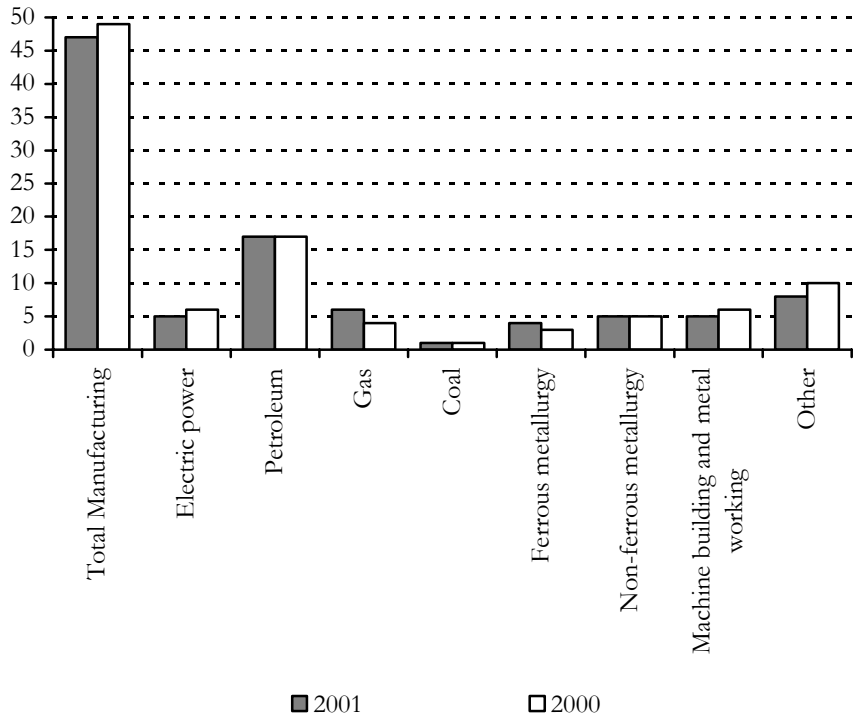
A2. Technology Investment Patterns of Russian Mining and Metal Companies

The metallurgy and metal-working cluster, like any other economic sector, requires regular and sufficient investment to sustain its development. While in Northwest Russia the level of investments into metallurgy is near the average levels in other industries of the region, it is clearly insufficient not only for creating new, highly efficient production facilities, but also for upgrading the outdated equipment used today.

The fixed assets of some metallurgy enterprises have been used for over 60-79 years, while their must be no more than 25 years. Significant technological lag behind the world metallurgy industry still exists.

In the beginning of 2000, the share of own capital of metallurgy enterprises of the Northwest amounted to 58% of their aggregate financing, outside capital being 42%.[6] Over the past few years there has been a

Figure A2.1 Aggregate Investment in Russian Economy, % of Total Volume



Source: www.metal.com

6 According to data provided by Metalltorg.ru analytical team.

Table A2.1 Output of Electric Steel and Basic Oxygen Steel in Total Output of Steel, %

	1990	1995	1996	1997	1998
Russia	46.5	58.0	64.1	67.8	72.3
Bulgaria	90.0	100	100	100	-
UK	100	100	100	100	100
Hungary	62.2	99.9	100	100	100
Germany	-	100	100	100	100
Italy	99.9	100	100	100	100
Canada	99.2	100	100	100	100
China	80.0	83.9	86.5	-	-
Poland	70.8	87.1	89.3	90.8	-
USA	96.5	100	100	100	100
France	100	100	100	100	100
Japan	100	100	100	100	100

Source: Goskomstat (Russian State Committee for Statistics), 2000

Table A2.2 Output of Steel Produced by Continuous Casting Technology in Total Output of Steel, %

	1990	1995	1996	1997	1998
Russia	23.1	36.6	40.7	46.8	51.8
Bulgaria	19.6	24.8	23.9	23.1	-
UK	83.6	86.6	88.4	90.0	94.4
Hungary	64.2	91.2	95.6	96.3	99.4
Germany	-	95.4	95.8	96.0	95.7
Italy	94.8	96.2	96.6	96.3	96.1
Canada	76.8	97.1	97.0	97.6	97.9
China	22.3	45.9	53.3	60.7	68.8
Poland	7.6	21.3	32.6	47.9	38.4
USA	67.4	91.0	92.4	94.7	95.5
France	94.3	94.3	94.6	94.9	94.7
Japan	93.9	95.8	96.4	96.6	96.9

Source: Goskomstat (Russian State Committee for Statistics), 2000

general decrease in the share of own capital and an increase in the share of outside capital. This is mainly attributable to the decrease in the share of the enterprises' idle cash, which is partly related to the decline in exports, the drop of world prices for several products, and the disparity between world and domestic prices. Simultaneously, a growth in domestic demand for metal products is observed. If this process continues, domestic metallurgy enterprises will be able to use the increase in sales in Russia to offset partly the losses incurred due to shrinking of foreign markets.

On the other hand, further growth in domestic borrowing is highly unlikely in the coming years. Although the banking system is accumulating more funds, the share of bank lending in the GDP, which was around 22% in 2001, is now decreasing. Banks are reluctant to accept high risks and long payback periods associated with large metallurgy – investment projects, as the average payback period of 6-7 years in metallurgy is several times longer than in retail, food industry and other investment-attractive sectors. Because budget funding is not readily available and the fiscal system does little to help the emergence of domestic investment mechanisms, the enterprises' own capital and foreign corporate capital remain the only possible sources of investment in metallurgy.

Companies' Own Investment Projects

In the recent years, many metallurgy enterprises have developed innovative projects financed from the companies' own profits. In the Northwest these are, above all, the enterprises of Severstal and Norilsk Nickel holdings.

The largest investment projects in the Northwest Russian ferrous metallurgy industry are those, which are realised by Severstal. First of all, this is modernisation of basic metallurgy facilities in the Severstal plant aimed at certification of open-hearth steel production. Another large project was Alliance 1420 (see Box 4.2), has failed. Nevertheless, Severstal purchased Rolling Mill 5000 from Izhora Plants in 2000. This rolling mill was previously used for production of wide steel shits for nuclear power plants. Now, it is under reconstruction in order to ensure world quality standards and to increase its production capacity about 3 times. According to the company's plans the reconstruction of Rolling Mill 5000 will be finished in 2004 (this project was put into stand-by recently).

The most promising projects realised in the non-ferrous metallurgy of the Northwest are related to reorientation of nickel refining facilities to cobalt and platinoids, and to reprocessing of material remaining after primary treatment of ore and extraction of nickel. The two most ambitious investment programs are now being implemented at the Severonickel and Pechenganickel plans that belong to Norilsk Nickel. Simultaneously, the plans are running projects aimed at developing copper-electrolysis and carbonyl production, as well as recycling of catalytic agents and platinum-palladium and radio-electronic scrap. The low cost of recycling and reprocessing of scrap located on the grounds of the enterprises makes these projects attractive to foreign investment funds and banks. Among them are Fidelity Investments group (UK), Brunswick UBS Warburg (UK), Fedsure Asset Management (Republic of South Africa). At present, long-term investment agreements are being negotiated with these institutions.

Another significant investment project in the non-ferrous metallurgy of Northwest Russia deals with construction of a corporate railway link by SUAL, Russia's second largest aluminum holding. The railway will provide access to the major Middle Timan bauxite deposit. Total project funding amounts to USD 105 million. Implementation of the project is expected to reduce the mining cost of Timan bauxites from 28 USD per ton of ore to 5-7 USD. The project is part of a larger investment programme carried out by the holding and including construction of an alumina-and-aluminum plant in Komi Republic. Upon achieving its full capacity, the alumina-and-aluminum plant will produce 1.2 million tons of alumina and 600,000 tons of primary aluminum yearly. The total cost of the investment programme is estimated at USD 2 billion. Implementation of this project, however, depends largely on the world prices for aluminum, which often have been on the decline for the past few years.

Foreign Corporate Investment

Foreign investment is an effective resource for development of production facilities. Yet, the use of foreign investment in the metal cluster is limited in scale, both in Northwest Russia and the rest of Russia. Inflow of foreign portfolio investments – the most mobile sources of finance for production projects in developed markets – is deterred by the low credit rating of Russia and, consequently, the enterprises of Northwest Russia. The credit ratings assigned by the world's leading agencies Standard&Poor's and Fitch and used made by leading institutional investors as an indicator for investment decisions still classify Russia as a place for high risk operations rather than investment. It was not until July 2002 that Russia's credit rating overcame the pre-crisis (August 1998) level; currently it remains at BB-. Russia is still four notches below the threshold rating of BBB- – the important dividing line between risk operations and investments. Given the current economic growth and political stability, the process may take at least a year. Heavyweight portfolio investors cannot be expected to enter the metal cluster of Northwest Russia before that time.

At present, a significant portion of foreign capital comes as direct investment. Unlike portfolio investors who make decisions on the basis of risk calculations, international strategic investors focus more on analysing the development strategies of Russian enterprises and the general perspectives of the metallurgy industry of the region. However, inflow of foreign capital is hampered by the generally negative perception of Russian metallurgy among investors, that results from the widespread redistribution of property by force in the 1990s, compounded by poor legislation and outdated production technology requiring massive investment.

In this context, foreign participation in the metallurgy and metal-working cluster of Northwest Russia is considerably lower than in other industries, such as food or forest. It should be noted that the continuing capital outflow from Russia also works as a source of investment into capital assets whenever such investment is made by offshore companies. The geographical distribution of investors is one proof of that: 11.4% of all investment came into the Russian industrial sector from Cyprus; 48.6% of investment into ferrous and non-ferrous metallurgy – from the Antilles, Gibraltar and Switzerland. 2001 year trends indicate that the share of offshore investment is growing.

Common Problems Faced by Investors

The main problems impeding direct investment into the metallurgy and metal-working cluster are:

- Discrepancies and deficiencies in federal legislation regulating investment activities;
- Weak protection of property rights, and criminal risks;
- Low transparency of business, underdeveloped financial markets;
- Political and institutional risks: strong reliance of businesses on personal relations with the local authorities and the ensuing inequality of market players;
- High social costs incurred by metallurgy enterprises as a legacy of the Soviet period;
- Strong dependency on energy supply, low quality and high development costs of most raw materials deposits in the region.

The section below analyses some of these groups of risks. Other problems are dealt with in other sections of this paper.

1. Deficiencies in legislation

Most regions of Northwest Russia have passed investment-friendly legislation. The investment regulations of some regions are among the most advanced in the country. These are, in the first place, Leningrad and Novgorod regions. For example, the Law of Leningrad Region "On Investment Activities" exempts investors from all regional taxes during the project payback period. At the same time, ineffective federal regulation of the investment process undermines the regions' attempts to improve the investment climate. Investment incentives are still decided on by a handful of key administrative officials. Therefore, the success of a project greatly depends on personal relations with the local administration,

rather than the project's economic efficiency. Established contacts are often severed with changes in the political structure of the region, which brings the project into jeopardy.

There is no clear-cut division of powers between federal and regional authorities regarding the size and eligibility criteria of government guarantees and privileges for private investors. Special arbitration courts for disputes involving foreign investors have not been fully instituted yet. Despite the adoption of the new Land Code, nearly all regions of Northwest Russia have yet to develop their regulations governing the transfer of title on land to investors. Moreover, regulations on long-term lease of land occupied by components of industrial infrastructure have not been solidified.

The position of foreign investors can be significantly improved with the passage of amendments and addenda to the Federal Law "On Production Sharing Agreements" in view of Russia's expected accession to the WTO. These will include:

- cancellation of the 30% quota on mineral resources for the development of deposits on the basis of Production Sharing Agreements (PSA);
- cancellation of the requirement that registers of deposits intended for development on the basis of PSA be approved by federal law;
- revocation of mandatory quotas on the use of domestic equipment and national personnel.

Accession to the OECD Multilateral Investment Agreement, an instrument aimed at replacing the existing network of bilateral investment agreements, will be another important step towards achieving a better investment climate.

Development of investment projects in the metallurgy and metalworking cluster of Northwest Russia is hampered by the lack of a detailed mechanism for long-term leasing of equipment used for technical modernisation of production facilities. The current legislation on leasing should be supplemented with an additional norm permitting to use leased domestic equipment in the implementation of projects. Manufacturers of such equipment should be entitled to preferential crediting terms, which are not in place yet.

2. Property rights and criminal risks

Weak protection of property rights is another major obstacle that stands in the way of investments into the metallurgy industry. Redistribution of property rights and restructuring of assets are often accompanied by

grave violations of rights of both property holders and investors. Deficiencies and loopholes in the legislation are often used to gain control over property by acquiring enterprises at several percent of their market value. Here, Olenegorsk GOK (Olcon) serves as a good example. In May 2002, Vash Finansoviy Popechitel (VFP), a company specialising in portfolio investments, used legal loopholes to acquire 25% in Olenegorsk GOK, reserving the right to resell the stock, at an enormously inflated price of USD 10 million, to MDM Group (owner of Kovdor GOK and another supplier of iron ore to Severstal), or to Severstal. When both holdings refused to buy the stock from VFP, the plant operations were brought to a standstill. Litigation of the case continues to the present day.

Another popular method of redistributing property rights is by using established political connections, as well as by purposefully initiating bankruptcy procedures against competitors. The Federal Law "On Bankruptcy" contains a large body of regulations according to which a bankruptcy procedure (including crisis management) can be initiated against any viable economic entity. Over one third of all bankruptcy procedures in Russia are started with the intention to eliminate competition. The new law on bankruptcy, expected to be passed by the State Duma in 2003, does little to eliminate the most dangerous loopholes that can be used to bankrupt even successful manufacturers. The bill was returned for revision, and the misuse of the current law continues.

The problems associated with redistribution of property rights are especially acute in the metallurgy industry, where initial redistribution of capital in the first wave of privatisation in the early 1990s was carried out in a legal void. Take-overs were frequently accompanied by use of force, violation of property rights, and often criminal conflicts. In that period the term 'aluminum wars' became popular, reflecting the numerous and violent captures of competitor enterprises. The process ended in the late 1990s with the formation of several large horizontally-integrated holdings in both ferrous and, especially, non-ferrous metallurgy. These holdings took over both large and small production facilities. In Northwest Russia, the process of property redistribution was somewhat less intense than at the largest enterprises in the Urals and Siberia. Nevertheless, the cluster still carries criminal associations in the eyes of domestic and foreign investors. Today the process of assets consolidation is over in both ferrous and non-ferrous metallurgy. Meanwhile, the last years have seen a shift towards vertical integration strategies. Confronted with vigorous attempts to curb Russian metal exports to the foreign markets, major players have been forced to expand markets within the country, acquiring production facilities that can act as consumers. In Northwest Russia this approach is most actively used by Severstal. In 2001 Severstal ac-

quired a controlling stake in Ulyanovsk Automobile Plant. In 2002 it took over Zavolzhsk Motor Plant and established SeverstalLat, a joint subsidiary with the Riga Wagon Works (Latvia).

By contrast, today the process of property redistribution is becoming less chaotic. The market is split between the main players, and open confrontation appears disadvantageous to all. Therefore, with regard to the few remaining independents forceful acquisition tactics has been rejected in favour of mergers and take-overs, carefully planned by highly-qualified legal and financial experts. Taking advantage of flawed Russian corporate and procedural legislation they use minority shareholder suits to suspend Boards of Directors, discharge elected CEOs and appoint insiders to corporate executive positions in order to control cash flows and property of the target enterprise.

The most vivid example of this is the court order to freeze 34% of Severstal shares after a claim filed by the ex-wife of Alexei Mordashov, the holding's Director General. The scheme is thought to have been devised by Iskander Makhmudov, head of Urals Mining and Metallurgical Company (Russia's second largest copper manufacturer). Companies that fall prey to take-over assaults spend substantial sums to overcome such legal decisions; sometimes they have to prove the existence of unlawful confederacy between the plaintiffs and the arbitration court. Even if justice is administered impartially, unlawful rulings may be difficult to avert due to the incomplete, disordered and contradictory provisions contained in the legislation governing property issues.

3. Transparency of businesses

Lack of business transparency remains an essential factor precluding acceleration of investment into the metallurgy sector. Fearing hostile take-overs and loss of control over their business, most companies provide limited information on their shareholders, property structure, and accounting procedures. This deprives investors of adequate information for making investment decisions. Adoption of international standards of fiscal accounting and improvement of business transparency are indispensable requirements for attracting foreign investors, as well as the major Russian investors. However, preparation of documentation required for transition to international standards is costly and may reveal sensitive information on the company's shady transactions in the past.

Today only the largest enterprises of the region striving to expand their export operations can afford to introduce advanced management and accounting procedures that enable them to report true and up-to-date information, which is prerequisite to transition to international ac-

counting standards. Severstal is the recognised leader in this process. Nevertheless, in Russia mere transition to international standards does not necessarily imply greater transparency of business operations. Even companies that use international accounting do not publish much of the data on their main shareholders, shareholders' rights, finance and production in their annual reports. A Standard&Poor's report on business transparency in 42 Russian stock market leaders, published in September 2002, does not mention enterprises of the metallurgy and metal-working cluster except Severstal. Severstal holds the 33rd position on the list, with a corporate transparency index of 0.25 (the corporate transparency index of the two top companies, MTS and Wimm-Bill-Dann, being 0.77 and 0.73 respectively).[7] Other enterprises of the cluster have even less transparency. That is why not only acquisition of companies but even participation in individual projects is associated with uncertainty and high risks for investors.

4. Political risks

At present, business success of the largest metallurgy companies still largely depends on their relations with the local authorities. Most major metallurgy enterprises act as the driving force of economic development of the regions and the backbones of urban infrastructure. Therefore, they have to co-ordinate their efforts and operate closely with local authorities with regard to their social policy (employment, maintaining the social infrastructure, etc.). Lack of support on the part of regional and municipal administrations makes investment projects difficult, and in the case of small- and medium-scale projects almost impossible to implement. On the other hand, interaction with local administrations is complicated by high political instability and high turnover of administrative officials in all bodies of power, which means that investors have to start repeatedly from scratch in their relations with the local authorities.

In pursuing their personnel policies, enterprises have to take into account their function as the central element of urban infrastructure. As a result, restructuring programmes involving mass personnel layoffs are actively opposed by local administrations.

Growth in productivity and output at manufacturing enterprises is hindered by another external barrier, namely the system of implicit energy subsidies granted by the federal centre to small unviable plants in the form of debt reliefs and highly-profitable barter deals.

---

7 Calculation of the index was based on the assumption that 1 is the amount of information sufficient for making an investment decision.

Conclusions

The following prerequisites to successful implementation of projects can be noted in conclusion:

- The system of Russian investment legislation has not been completed and current legislation contains numerous loopholes and contradictions. Several regions of Northwest Russia – Leningrad, Novgorod and Vologda Regions – have made some progress in working with foreign investors. Yet, they are unable to realise their potential due to deficiencies in federal legislation;
- Companies remain behind in terms of corporate transparency and information disclosure, although the majority of enterprises of the metal cluster of Northwest Russia have the form of open-type joint-stock companies whose shares are quoted on the stock exchange. The assets liquidity of most companies is rather low;
- The level of protection of property rights remains low due to poor legislation, primarily the highly ineffective bankruptcy mechanism;
- Successful implementation of investment projects requires building up and maintaining close relations with local authorities. High political instability results in frequent turnover of key administrative officials and additional risks to project implementation;
- No mechanism exists for granting preferential terms to enterprises manufacturing and leasing equipment for the metallurgy sector.

A3. Secondary Metals and Scrap Recycling: Effective Strategies for Development

Recycling of ferrous and non-ferrous metal scrap and waste has major importance for the metallurgy and metal-working cluster. Use of secondary raw materials allows to significantly decrease the cost of metal products, electric power consumption, and emissions. This chapter analyses the Russian markets for ferrous and non-ferrous scrap metals, and attempts to find possible ways to improve their performance.

One should start by noting an essential distinction between ferrous and non-ferrous scrap markets. This distinction is reflected in laws and regulatory policies across the globe. In Russia, however, it was only put into legislation in 2001, with the adoption of the law 'On Licensing of Certain Types of Activities'. According to the law, collection, recycling, and sale of scrap is subject to mandatory licensing, separately for ferrous and non-ferrous metals. For a long time the government regulatory system did not reflect the specifics of ferrous and non-ferrous scrap recycling, which resulted in structural distortions in both markets. Effective development of scrap recycling requires specific State regulatory measures for ferrous and non-ferrous metals markets. This is why in this chapter they are examined separately.

Ferrous Scrap Market

Before the early 1990s, collection and recycling of scrap metal in the Russian Federation was performed by an elaborate network of regional enterprises ('vtorchermety') who had an exclusive right to recycle and supply raw materials to metallurgical plants. The system ensured highly efficient nation-wide collection of generated scrap in a state-controlled economy.

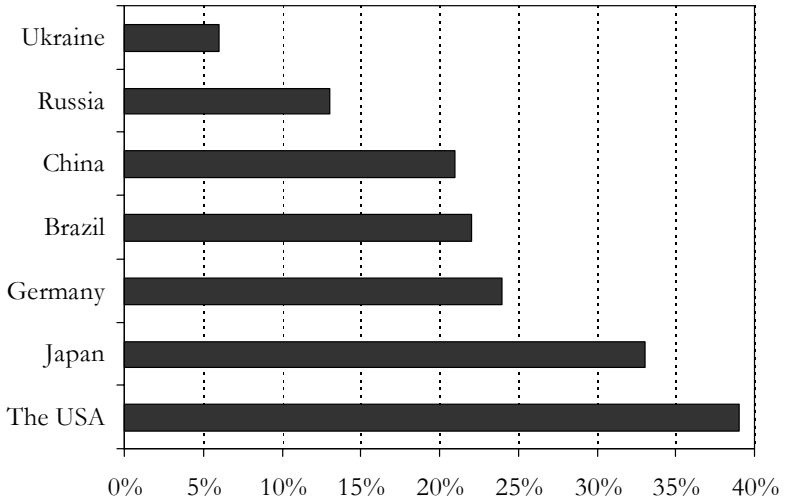
The market for ferrous scrap collection and recycling started to take new shape after 1996, when, facing bankruptcy due to non-payments and the spread of barter, recycling enterprises were allowed to export ferrous scrap. The number of market players surged from approximately 200 in 1996 to several thousands in 1998. Export revenues made it possible for many enterprises to weather the crisis safely and increase the volume of collection and recycling of scrap metal. Overall, the secondary raw materials turnover increased.

Three groups of players can be distinguished today in the secondary raw material market:

1. Processing companies that ship scrap metal to metallurgical plants under direct contracts of sale. There are approximately 4-5 thousand such companies.
2. Joint stock companies established through privatisation of the former Vtorchermet regional branches. There are 72 such companies. Another 20-30 companies were formed out of individual Vtorchermet shops and plants. Accounting for approximately 50% of the overall scrap supply, they play the key role in the market.
3. Commercial entities that focus on buying and reselling scrap collected by Vtormet companies. Their number is difficult to estimate, as many of them belong to the so-called 'one-day corporations' created for semi-legal, often seasonal, under-the-counter operations.

The Russian Ministry of Antitrust Policy describes the Russian ferrous scrap market as a "having low concentration and a developed competitive environment." Contrary to this, over the past years the existing waste recycling system has been the scene of major structural changes, giving rise to large scrap collectors who now control collection markets in several regions of Russia. The market in Northwest Russia is dominated by Vtorchermet located in St. Petersburg. The Vtorchermet facilities can process up to 60,000 tons of ferrous scrap a month (the entire region is estimated to generate 200-250 thousand tons of scrap a month).

Figure A3.1 Share of Steel Produced from Scrap Metal, % of Total Output of Steel



Source: Profile magazine, 1999, No. 35

Other major recyclers include regional Vtorchermet subsidiaries, the Master group (also operating in the non-ferrous segment), and Kuusakoski subsidiaries in St. Petersburg, Vyborg, Arkhangelsk, Petrozavodsk, and Murmansk.

The main consumers of ferrous scrap are large metallurgy plants and pipe manufacturers that use it to produce steel and iron.

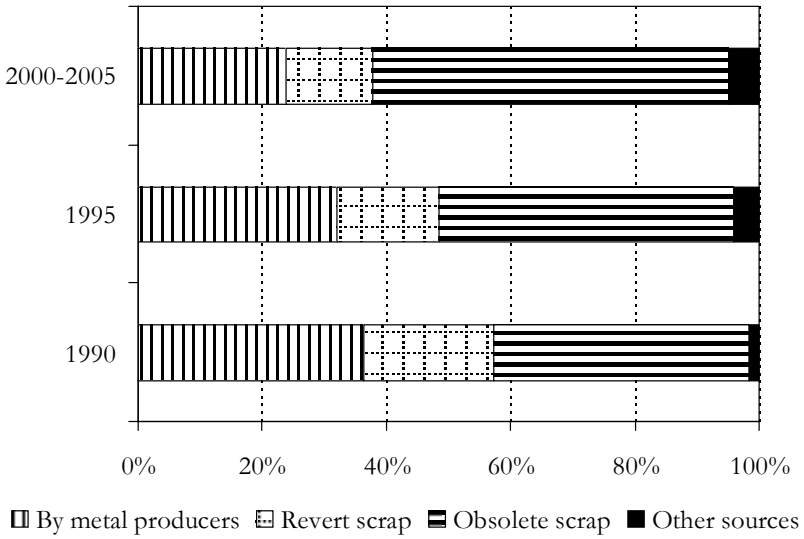
Utilisation of secondary metals in Russian metallurgy remains far below Western standards. This is explained by the low quality of scrap, and the fact that even today steel is mostly produced in Russia using blast-furnace and converter technologies. When these two technologies are used, the share of scrap metal in the overall mass of raw material cannot exceed 10-15%, while with electric furnaces it can be increased to 90%. Northwest Russia is the leading region of Russia in developing advanced technologies of scrap metal utilisation. Due to its high concentration of metal production and machine-building, it is one of the biggest consumers of ferrous scrap. Thus, Severstal consumes about 15% of all secondary metals in Russia; another 5% are consumed by the St. Petersburg-based Petrostal.

Large volumes of consumption explain why metal producers of the Northwest are so sensitive to variations in price for scrap metal. In 2001, the average purchasing price set by Russian metal companies was USD 40 per ton of ferrous scrap. Exports to countries inside and outside CIS were priced at USD 50 and 74 respectively. Domestic underpricing of scrap is welcomed by the metal producers, but not by recyclers, as it stands in the way of production upgrade and precludes them from expanding their operations. There is a whole range of factors contributing to the increase of the processing costs that may lead to disruption of scrap metal supplies and, ultimately, undermine the competitiveness of the Russian metal industry.

One important factor is the change in the sources of scrap metals. The introduction of new continuous-casting metallurgy technology has reduced the amount of revert scrap – the scrap generated by steel mills and foundries themselves. Therefore, most secondary metals are derived from obsolete scrap, generated through replacement of operating assets. Before 1990, new equipment was installed on average 5.9 times faster than old equipment was dismantled. By 1998, this ratio dropped to 1.2 times and continues to decrease. At the same time, a substantial part of operating assets has been decommissioned and never replaced, and a large proportion of the operating assets currently in use has reached a considerable degree of depreciation (over 65-75% in some industries). This means that utilisation of obsolete scrap will continue to grow in the

future. In addition, Russian industry is accumulating undismantled, out-of-service equipment – the so-called 'hidden' obsolete scrap. All this accounts for the constant decline in the supply of revert scrap – the most 'clean' and easy-to-recycle material – while the industry is receiving more contaminated, corroded and hard-to-recycle obsolete scrap, and the processing cost rises accordingly. Changes in the sources of scrap are not a uniquely Russian tendency: a similar increase in the share of obsolete scrap is observed in the industrially developed countries. This challenges recyclers with the task of developing new technologies in order to bring down the recycling cost of obsolete scrap.

Figure A3.2 Scrap Metal Resources by Origin, %



Source: www.metaltorg.ru

Another important factor is the dependency on transportation costs. Most scrap processed in Northwest Russia is shipped from other regions, which makes transportation of collected scrap an issue for consumers, collectors and operators. At present, transportation is the most substantial element (sometimes up to 55-75%) in the cost structure of ferrous scrap. In this way the State railway monopoly and non-transparent tariff policy impedes development of the recycling market and brings the low cost-effectiveness of scrap collection (between 5% and 15%) even lower. Transportation tariffs were raised twofold during 2001, requiring collectors to spend 30-40% more on sourcing scrap metal and putting the whole industry on the brink of collapse. Only those collectors who are located in direct proximity to their consumers are able to survive under the current tariffs, whereas interregional ship-

ment is unprofitable. This changes the face of the market: while vast territories are not covered by scrap collection, areas that are close to consumers experience a shortage of available scrap.

Another serious implication of the lack of tariff regulation is the change in the scrap consumption pattern. Lightweight, highly corroded scrap with low bulk density is the most expensive to transport. A standard open wagon holds up to 30 tons of lightweight scrap, or 60-70 tons of heavy large-sized lump scrap. Being unprofitable to collect and recycle, lightweight scrap is replaced by heavy lump scrap. The resources of such scrap located within 500-700 km from the processing sites will be exhausted very soon. At the same time, more distanced lightweight scrap will remain uncollected. Demonopolization of the rail transportation industry seems unlikely in the short term. The situation can be improved by establishing recycling centres in areas with high concentration of ferrous scrap in order to ensure more efficient use of the metal resources of the regions.

A third factor destabilising the scrap recycling industry is the underdeveloped market infrastructure and the lack of a consistent regulatory policy in the sector. Until recently, a vast number of companies operated in the 'grey' sector, processing only high-quality, uniform scrap and rarely investing in equipment. This situation was especially common in the border regions – Leningrad and Pskov, from which ferrous metals are traditionally exported to the neighbouring Baltic States. The prevalence of 'one-day corporations' caused considerable seasonal variations in scrap supply. Meanwhile, only large plants could afford profound recycling of ferrous scrap, including sorting, gas-cutting, compacting and crushing, and the use of highly expensive special equipment. The 'Regulations on the Licensing of Activities Related to Collection, Processing, and Sale of Ferrous Scrap', adopted in May 2001, were supposed to address the problem of criminalisation in the sector by subjecting scrap recyclers to tighter control. For example, a company seeking a license was required to have the necessary processing equipment, such as a packing press, flame cutting machinery, chip breakers, and cranes. The Regulations, reflecting the government policy towards consolidation of recycling companies and for the benefit of the Vtorchermet companies, dealt a serious blow not only to the 'grey' firms, but also to law-abiding small- and medium-sized recyclers. Compounding the problem were bureaucratic delays in issuing new licenses, which resulted in a serious reduction in the supply of scrap metal in late 2001 – early 2002.

The above-mentioned factors pose a threat to the supply of secondary metals to the metallurgical industry and lead to an undercollection of

scrap metal. At present, the overall metal resources of Russia are estimated at 1.3-1.5 billion tons. The calculated potential collection of obsolete ferrous scrap is 26-27 million tons a year. In 1999, however, only 16.9 million tons of ferrous scrap was collected, 9 million of which was supplied to the domestic market, and 7.9 million was exported. The 15% export duty on ferrous scrap, adopted as a result of lobbying efforts on the part of large metallurgy companies in effect led to oversaturation of the market and aggravated the financial situation of some recyclers. The new duty was reciprocated by the European Union in the form of restrictions on Russian steel imports. As a result, 12 million tons of ferrous scrap was supplied to the domestic market in 2000, against 7.5 million tons of exports – official data.

The undercollection of ferrous scrap is so profound that it may cause a serious deficit of secondary materials. Analysts at the Co-ordination Board of Russian Scrap Recyclers estimate the profits lost due to undercollection at USD 700 million annually. Idle scrap metal is hazardous for the environment. Ferrous oxides and other chemical compounds seep into soil and underground water. According to some estimates, 8 million tons of soil in Russia is contaminated with ferrous oxides every year.

Box A3.1 European Response to the Deficit of Ferrous Scrap

At the beginning of the 1990s, the European metal industry was already expecting a steady deficit of scrap. The rise of price for scrap could make European steel producers less competitive in the world market. The outcome would have been similar to the situation in the Russian market, where competitiveness of metal producers largely depends on the purchasing price of scrap.

These forecasts proved wrong: in the mid-1990s the market saw an advent of scrap exporters from the CIS countries. Nevertheless, European experience in overcoming expected scrap deficit can be of interest. In the early 1990s ARBED, a major steel producer, decided to acquire a stake in several European scrap dealers and established Almetal, a ferrous scrap collecting and recycling company. In 1998 Almetal took part in consolidation of the European ferrous scrap market, forming alliances and joint ventures, and managed to cut costs and increase profits. At present the company recycles about 1.5 million tons of scrap every year, with 30% of collected scrap still being supplied to the parent company ARBED.

Conclusions

The analysis above allows to identify several priority steps that should be taken to enhance the efficiency of ferrous scrap collection and recycling and to make the entire metallurgy and metal-working cluster of Northwest Russia more competitive:

- Government regulation policies in ferrous scrap collection and recycling should take into account the close link existing between metal scrap processing and metal production. Unbalanced development of these two sectors may negatively affect the entire metallurgy industry. Therefore, policy decisions should be made taking into consideration the interests of both metal producers and scrap recyclers.
- The future of scrap recycling in Northwest Russia largely depends on application of new metallurgical technologies that expand the range of usable secondary metals.
- Reforms of the transport sector will reduce shipping costs, balance out prices for metal scrap, and ensure supplies of relatively cheap raw materials to metallurgical plants without prejudice to the interests of scrap recyclers.
- Construction of new recycling centres, especially in areas with high concentration of scrap, is needed to enhance the rate of scrap utilisation.
- Continued adoption and elaboration of legislation is required to stem criminalisation of the recycling sector and to increase tax revenues from scrap recyclers. Tax incentives can be used to stimulate compliance of scrap collectors with environmental protection policies.

Non-ferrous Scrap Market

The economic reforms have affected the Russian market for non-ferrous scrap metal in much the same way as the market for ferrous scrap metal. After the collapse of the centralised system for scrap collection, the share of scrap handled by plants belonging to Vtortsvetmet – the non-ferrous scrap division of the former Ministry of Non-Ferrous Metallurgy of the USSR – shrank to 25-30%. The rest of the market was split among a multitude of midget companies whose core activities mainly involved resale and export of non-ferrous scrap. Unlike the somewhat less criminalized ferrous scrap market, the market for non-ferrous scrap and waste quickly became one of several economic sectors where crime is all-pervasive.

From 1994 to 2000, the number of criminal incidents involving operations with non-ferrous scrap increased by 30 times. Pilfering of metal-containing objects and their parts account for 8% of all cases of theft in Russia. Looting of non-ferrous metal affects railways, electric power transmitting lines, and other vital elements of infrastructure. RAO UES, the largest national electrical grid operator, reports that in 1999-2000 it lost USD 100 million as a result of non-ferrous scrap looting. According to RAO UES data, Russia exports about 700-800 thousand tons of non-ferrous scrap annually. Only less than 1 thousand tons of it is naturally generated scrap; the rest is looted scrap. The Co-ordination Board of Russian Scrap Recyclers estimates that every year up to 30-40% of non-ferrous scrap (over 500,000 tons) is collected through various shady schemes. Increased looting of non-ferrous scrap is caused by its relatively high price. In the beginning of 2002, the purchasing price of scrap aluminum was around USD 900 per ton; secondary copper and copper alloys were purchased for about USD 1,100 per ton. By contrast, world prices for primary aluminum and copper were around USD 1,400 and 1,450, respectively.

The main segments of the Russian market for non-ferrous scrap metal are: aluminum scrap (over 50%), copper scrap (about 30%), and bronze and brass (10%). The rest is made up by lead and zinc. According to the Union of Metal Exporters of Russia, in 1999 Russia collected about 1.1 million tons of non-ferrous scrap. Yet, it is impossible to give an accurate assessment of the size of the non-ferrous scrap market, because:

- There are no reliable government statistics for non-ferrous and ferrous metals. The use of state statistical reporting forms *No. 9-lom* (ferrous scrap) and *No. 17-lom* (non-ferrous scrap) was discontinued in 1996. Later, statistical monitoring was mainly carried out in the interests of various government agencies and was related to resource conservation and environmental protection.
- There is a large number of illegal and semi-legal firms operating on the market. They do not report their operations to the authorities.

One of the leading operators in the market of Northwest Russia is the Master group, with the annual turnover of nearly USD 100 million. According to some estimates, it controls up to 20% of the market. Other major recyclers are Severstal (St. Petersburg) and the subsidiaries of Finnish Kuusakoski, including its secondary aluminum smelter in Vyborg. The main consumers of non-ferrous scrap are metallurgical and machine-building companies, such as Krasny Vyborzhets, the Kandalaksha Aluminum Plant, the Nadvoitsy Aluminum Plant, and others.

In the late 1990s, non-ferrous scrap was mainly shipped abroad. According to some estimates, out of the 1.1 million tons of scrap collected in 1999, 700 to 750 million tons were exported. The reasons behind the prevalence of exports were the substantial difference in price for non-ferrous scrap in the domestic and foreign markets and the greater efficiency of payments. Attempting to curb the export of national metal resources, the government has been gradually increasing export duties. At present, export duties for non-ferrous scrap are at the level of 50%. The federal bill 'On the Government Regulation of Export of Non-Ferrous Metal Scrap and Waste' contains even more stringent measures. It introduces a ban on the export of non-ferrous scrap from Russia until 2005. The bill was passed by the State Duma on 20 November, 2000, but was vetoed by the President. The parliament overcame the veto, but this time the bill was rejected by the Council of the Federation.

Box A3.2 Licensing of Recycling Operations in Ukraine

After the collapse of the Soviet Union, the Ukrainian non-ferrous scrap market faced the same challenges as the Russian market. Ukrainian legislators chose to address the situation by tightening regulation of the secondary metals market.

The Ukrainian parliament – the Rada – passed amendments to the national 'Law on Scrap Metal', according to which handling of ferrous and non-ferrous scrap requires separate licenses. Instead of specifying which scrap recycling equipment a company must have to obtain a license, as in Russia, the Ukrainian legislators adopted a far more rigid regulatory framework. For non-ferrous scrap, the term 'metallurgical processing' was introduced, to indicate the process of re-melting scrap metal intended to be used in manufacturing.

"Metallurgical processing" operations can be performed with the use of equipment that is produced and installed by designated agencies; they also require expert approval from the fire, environmental and sanitary inspectorates, and other supervisory bodies. Also, the company should be accredited as a 'specialised metallurgical enterprise' by an organisation authorised by the Ukrainian Ministry of Industrial Policy.

Every scrap recycler must follow the approved operating procedures and employ personnel qualified to carry out production monitoring and quality assurance.

Tighter regulation of the industry helped to improve the quality of material obtained through recycling of non-ferrous scrap. Production became more focused on the individual consumer, and the avenues for exporting non-ferrous scrap disguised as final products were narrowed. Scrap re-melted outside the regulated industry is no longer in demand, as the purity and safety requirements for alloys are becoming more stringent. Nearly all handlers sort scrap by grade in accordance with industrial standards and ensure separate storage of various grades. More stringent requirements have also caused them to tighten control over smelting procedures.

Higher export duties have led to an increase of illegal exports of non-ferrous scrap. According to official statistics, in 2001 illegal exports accounted for 15,000 tons of copper, about 40,000 tons of nickel and 5,000 tons of aluminum. More precise figures would be difficult to obtain, since the prohibitive duties have spurred shady exports of so-called "quasi-final" items. For example, many collectors and exporters of aluminum now re-melt aluminum scrap into ingots and export them. Duty on ingots of secondary aluminum amounts to only 5% and re-melting increases the costs by a mere 3-5%. Export of aluminum plates, formally categorised as final items, is even more profitable.

Conclusions

The ferrous and non-ferrous scrap markets display much similarity regarding problems and their solutions. Non-ferrous recyclers are equally challenged by the rising cost of rail transportation, the need to modernise recycling technologies, and the poor market infrastructure. One the other hand, the development of the non-ferrous market, considering its specificity, is contingent upon actions aimed to root out illegal practices, and, above all, on strengthening legislative regulation of the industry. The current legislation, particularly the 'Regulations on the Licensing of Operations Related to Collection, Recycling and Sale of Non-Ferrous Scrap Metals', still contains a number of profound contradictions. No tangible improvements have been observed since the amendments to the Russian Criminal Code were adopted in 2001 to provide stricter penalties for theft of items containing non-ferrous metals. Apart from export of non-ferrous scrap, government regulation of the industry should be extended to scrap collection. More vigorous enforcement of licensing regulations can be used to make the secondary metals market more transparent and to prevent damage caused by the theft of non-ferrous metals to the vital sectors of the Russian economy.

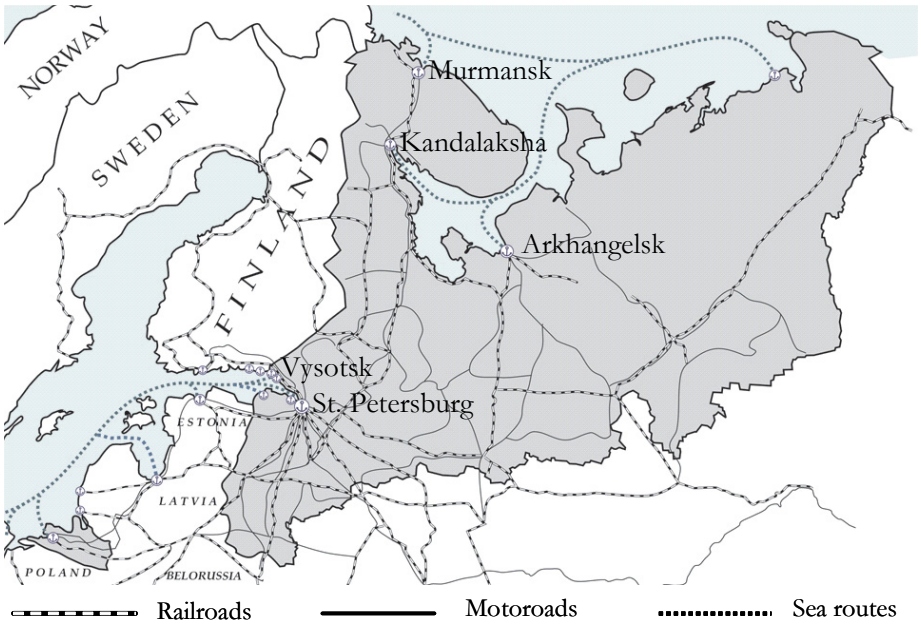
A4. Logistics: Assessment of Bottlenecks

The aim of this study is to describe the Northwest Russian logistics system, to analyse its advantages and bottlenecks, as well as to identify further development trends and their influence on the metal-working cluster.

The importance of logistics for the Northwest Russian metal cluster is determined by the following:

- Territorial remoteness of mining and processing enterprises from each other. The majority of cargos are transported long distances by railroad transport – the average distance of freight transportation is 3-5 times greater than in European countries.
- Export-oriented nature of the metal cluster of Northwest Russia – 55% of ferrous metallurgy and 85% of non-ferrous metallurgy output is sent for export. The cost, terms and quality of shipments directly influence exporters' competitiveness in the world market.
- Existence of domestic consumers of the cluster's output far beyond the region's borders.

Figure A4.1 Map of Main Transport Routes in Northwest Russia



The transport system of Northwest Russia is relatively well developed compared to the Siberian one and represented by all types of transport routes. The main inland water routes are: the rivers Northern Dvina, Sukhona, Pechora, Mezen, Onega, and the system of rivers, lakes and canals interconnecting the Baltic Sea, the White Sea, and the river Volga. The main railroads are: St. Petersburg – Moscow, St. Petersburg – Helsinki, St. Petersburg – Murmansk, St. Petersburg – Vologda, Arkhangelsk – Moscow, and Konosha – Kotlas – Vorkuta. The major seaports in Northwest Russia are: St. Petersburg, Murmansk, Arkhangelsk, and Kaliningrad. There also are several smaller seaports – Kandalaksha, Vysotsk, etc.

The following is a thorough description of the railroad, sea, river and motor freight transport used by the companies of the metal cluster of Northwest Russia.

Railroad Transport

A major part of the domestic freight turnover of the cluster companies goes through railroad transportation. Transport costs constitute a significant part of the production net cost. For example, the average share of the railroad transportation tariffs in the price of metal production at the beginning of 2001 amounted to 20%. Therefore, the level and the dynamic of the railroad tariffs directly influence the economic efficiency of the metallurgy companies. The share of ferrous metallurgy in the cumulative volume of the railroad freight in Russia amounted in 2000 to 23%.

All Russian railways are owned by the State represented by the Ministry of Communications. In Northwest Russia the railways are operated by two State owned companies: the Oktyabrskaya Railways and the Severnaya Railways. It should be also noted that the State is the monopolist both in railways and the supporting infrastructure (goods and passenger station yards, communications, etc.). Private companies may own only railway cars. The biggest private railway company in Northwest Russia is Eurosib (St. Petersburg) whose freight turnover in 2001 reached 18.3 million tons. The largest metal companies also introduce their own railway transport departments, and these departments exclusively specialize in the logistics of raw materials and other supplies, as well as sales logistics, in order to minimize the dependence on the State to the lowest possible extent. However, the existence of private companies in the market of cargo transportation does not cover the deficiencies of the railway system. Among the main 'bottlenecks' of this system the most important are the following:

- High level of wear and obsolescence of railway car fleet;
- Shortage in specialized railway carriages;
- Inefficient logistics (regular delays and even losses in cargo delivery);
- Low transparency of transport operations;
- Cross subsidizing of cargo and passenger transportation and the resulting excessive tariffs for transportation of cargo.

The issue of privatisation of Russian railways has been regularly discussed over the last decade, and it is still relevant at present. The biggest problem of the Russian railway system is the problem of cross subsidizing (which also exists in the electric power and gas industries). The Ministry of Communications compensates its losses from passenger operations (resulting from numerous privileges provided for various population groups and the low level of effective demand) by profits from cargo operations, which leads to excessively high tariffs for cargo transportation.

Tariffs for railway transportation are regulated by the Government of the Russian Federation. Prior to 1 August 2001 there were two tariff categories for cargo transportation, the domestic tariff and the international tariff. The latter was applied to international transportation and in the cases when the final destination of the consignment was not a seaport in Russia, but some seaport outside its territory, while the former was used for domestic transportation proper. Up until the economic crisis of 1998 these tariffs were equal, but after that, since the tariff was denominated in either Swiss francs or US dollars (while domestic tariffs were denominated exclusively in Russian roubles), the difference between them grew by 4.5 times. However, starting from August 2001, the tariffs were unified once again, but this process is gradual. First, this will concern only the consignments passing via Russian seaports, while the tariffs for railway transportation of cargoes beyond the borders of Russia will remain on the old level, and will be decreased over a period of several years. This policy aims at diverting cargo flows towards Russian seaports.

Some major producers are granted large discounts on the base amount of the tariff (up to 50-70%). The government explains this by the necessity to support domestic producers in the conditions of huge distances in Russia. On the one hand, this gives Russian companies a certain cost advantage, on the other hand, this does not motivate growth of production efficiency. Moreover, this practice decreases transparency of operations of the Ministry of Communications and motivates corruption.

The plans of the government to continue the increase of tariffs meet with resistance from the production companies. In particular, there are proposals to put an end to cross subsidizing, and institutionally separate passenger and cargo operations. Another way to minimize losses from higher railway tariffs is the improvement of logistics and use of alternative means of transportation, primarily inland waterways.

In 2001 the degree of deterioration of railway car fleet reached 60-70%. If the present level of deficiency of cars remains until 2006, the producers will be able to dispatch less than a third of what they produce.

Among a number of disadvantages of the current railway network of Northwest Russia, the main one is its scarcity, which prevents the development of existing ore deposits and hampers industrial links of the region with other territories of the country (the Urals, the Volga region). That is why the transit potential of Northwest Russia is not fully exploited. Among the new projects for developing the transportation system of the Northwest, the largest is a plan to construct the new Belkomur railroad.

Box A4.1 Construction of New Railways

The new Belkomur railway link will connect Arkhangelsk with Perm and will facilitate faster delivery of cargoes from the Siberia and Urals regions to the seaport of Arkhangelsk. Another reason for the construction of Belkomur is speeding up the development of natural resources of the Republic of Komi. It is planned to transport by rail the coking coals from the Pechora basin and the bauxites from the Timan deposits to the enterprises of the Urals region. The new transport link will also allow for development of new titanium, manganese and chromium ores deposits in the Republic of Komi.

The length of the railway will be about 1,250 kilometres. Belkomur will link Arkhangelsk, Karpogory (both – Arkhangelsk Region), Vehdenga, Mikun, Syktyvkar (all - Republic of Komi), Kudymkar and Perm (both – Perm Region, beyond the territory of Northwest Russia). The construction process will take over 10 years.

In order to develop the Middle Timan bauxite deposit, SUAL is building a 160-kilometer railway link near Syktyvkar. The required investment amounts to about USD 60 million, which accounts for more than half of the total cost of the Timan Bauxite project.

Sea Transport

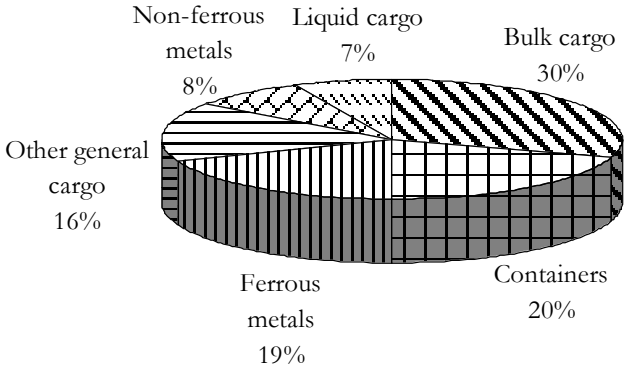
The Northwest region has historically played an important role in foreign economic relations of Russia with the countries of Europe. At present

this region accounts for up to 43% (96 million tons per year) of all Russian export and import freight carried by sea. Now, due to the lack of seaport facilities 52% (about 50 million tons per year) of foreign trade cargoes go through the ports of the Baltic countries and Finland.

There are three large private transportation companies – the Baltic, Murmansk and Northern shipping companies. The Baltic shipping company has practically dropped out of the market: the total dead weight of its vessels in 2001 was just 32,000 tons (only 2 vessels). The Murmansk and Northern shipping companies occupy better positions, but the number of their vessels has considerably decreased during the last decade as well, and foreign carriers dominate in providing sea transportation for Russian freights (more than 95% of the total). This situation is explained by the fact that in the 1990s the majority of Russian sea vessels were sold to foreign owners (mostly offshore companies).

The share of metallurgy and metal-working products in the structure of cargoes transportation by sea transport amounts to 13-14% (a larger share, which is over 50%, belongs only to the products of the energy cluster). The Nadvoitsy and Kandalaksha aluminum plants export their products through Kandalaksha port (Murmansk Region). Karelsky Okatysh ships part of its output through Vysotsk port (Leningrad Region). The port of Murmansk (non-freezing, as well as Kaliningrad) provides for the freight turnover of Norilsk Nickel in Norilsk (Siberia) together with Severonikel and Pechenganikel located in the Murmansk Region. It

Figure A4.2 Freight Turnover of St. Petersburg Seaport in 2002 by Type of Freight, %



Source: www.metalinfo.ru

must be noted that navigation through Northern sea routes is possible only in summer, and transportation of cargoes through Kaliningrad port will be profitable only after an agreement on a transit corridor is signed with Lithuania.

The St. Petersburg Seaport is the main sea gateway for metallurgy enterprises of the Northwest. The total annual turnover of this port over the recent years is about 35 million tons (20 million tons in accordance with official data, which does not include certain types of operations). In 2001 annual turnover of ferrous metals via St. Petersburg amounted to 3.9 million tons, and of non-ferrous metals – 1.6 million tons. A disadvantage of the St. Petersburg seaport is its shallow ship-canal (a maximum of 11.5 m) and high cost of its maintenance.

The present seaport capacity is clearly insufficient for the steadily growing cargo traffic, including metal products consignments. According to a mid-term prognosis made by the Ministry of Economic Development and Trade of the Russian Federation, cargo turnover in the seaports of Northwest Russia in 2007 is estimated at 101.2 million tons (compared to existing facilities providing traffic of 62.3 million tons). That is why at present the government is considering construction of new ports in the Gulf of Finland, as well as making reconstruction of existing port facilities the strategic target of economic development.

It should be noted that growth in demand for seaport facilities mostly resulted from a steady growth in exports of fuel products (oil, oil products and coal). That is why the construction of new seaports in Ust-Luga and Primorsk (both – Leningrad Region) will give priority to terminals for these types of goods. For example, in Ust-Luga the first will be the coal terminal, while the terminal for handling of metal products will be only the second.

The main competition for the seaports of Northwest Russia is provided by the ports of the Baltic countries and Finland – because of their better technical equipment and higher quality of services. Yet the newly introduced government tariff policy has made railway transportation to Russian seaports significantly cheaper, and the producers are planning to divert their cargo traffic correspondingly. Besides, the 'Baltic component' of the costs (additional railway tariffs for transportation over the territory of the Baltic countries) makes this route even less attractive.

The advantages of the Russian seaports of the region can be considered to be the following:

- State support given to transportation of cargoes via Russian seaports in the form of special railway tariffs for these destinations;
- Financing of development of seaport facilities by the State;

- Established cargo handling procedures, cooperation of ports, exporters, traders and freight forwarders.

The disadvantages of the seaports of Northwest Russia are the following:

- Lack or deficiency of specialized terminals for some types of cargoes;
- Limited handling capacities of port facilities, which is due not only to the capacities of the terminals, but also to the handling capacities of spur tracks and other elements of the infrastructure;
- Inflexible tariff policy in the sphere of rail-and-water works and corresponding ports' services;
- Low standard of services and problems connected with customs regime;
- Complicated meteorological and hydrographic operation regimes of the ports, which influence navigation conditions;
- Relatively low technical equipment of the ports in comparison to that of the Baltic competitors;
- Imperfection or lack of legal provisions regulating ports activities, which has led to a wide spread of shadow operations in Russian ports.

Inland Waterways

Until recently, inland waterways were not regarded by the industry as a viable alternative to railway transport, but due to the substantial increase of railway tariffs the leading metallurgy companies have been considering a wider use of water transport over the last years. In 2001 Severstal started domestic supplies of rolled stock (mostly to automobile plants) using inland water transport. This type of transportation is relatively cheap, but the short navigation period in northern rivers (in Northwest Russia most rivers are frozen for 6-7 months) means its use is quite limited. River boats are owned by regional shipping companies operating in major river basins and canal systems. Due to their difficult financial situation the boat fleet is obsolete, and some traditional waterways are not navigable due to the discontinuation of necessary hydro-technical activities (including dredging works) on some rivers over the last decade.

Road Transport

In the total cargo turnover of the metal cluster of Northwest Russia the share of road transportation in insignificant. It is mostly used for transportation of ore from mines to ore-processing plants and for transportation of scrap metal from wholesalers to their consumers. Being the largest

consumers of metal products, St. Petersburg and Leningrad Region possess a rather well-developed road infrastructure compared to other regions of Northwest Russia. In Europe road transport is much more widely used. In Northwest Russia its use is now hampered by lack of high-quality roads and highways, as well as by the fact that most freight of the cluster (ores and primary metals) requires large-capacity vehicles.

Conclusions

To sum up, below is the list of the main bottlenecks in the logistics of Northwest Russia:

- Low density of major communication routes;
- State monopoly of the railway system;
- Remoteness of enterprises from each other and from seaports – inevitably high transportation costs;
- Severe climatic conditions in Northwest Russia making sea and river navigation possible only during a few months;
- Outdated terminal equipment;
- High wear of railways (tracks) and rolling stock (railway cars, boats);
- Low level of informatization and lack of modern cargo processing and storage methods;
- High level of criminal activities, especially at terminals;
- Limited possibilities for using inland waterways and roads;
- Permanent problems at customs clearance checkpoints;
- Insufficient number of border-crossing checkpoints.

Despite all the deficiencies described above, the transport system of the Northwest possesses a number of factors which may contribute to its successful development:

- Northwest Russia has traditionally served as the gateway between Russia and Europe due to its geographical location and proximity to major sea routes;
- Crucial importance of foreign trade for the economy of Northwest Russia;
- The current protective policy of the Russian government aims to reorient foreign cargo transportation from the ports of the Baltic countries to the ports of Northwest Russia;
- New major industrial projects in Northwest Russia.

References

1. Annual rating of the largest industrial companies of the North-West of Russia - Expert North-West magazine, 22nd October, 2001.
2. Asanuma, B. (1989), Manufacturer-supplier Relationships in Japan and the Concept of the Relation-specific Skill. Journal of the Japanese and International Economies, No. 3, pp. 1-30.
3. Asheim, B.T. and Isaksen, A. (1997), Location, Agglomeration, and Innovation: Towards Regional Innovation Systems in Norway?. European Planning Studies, Vol. 5, No. 3, pp. 299-330.
4. Avdonin, V. Metal Deposits, 1998.
5. Barney, J. (1992), Integrating Organizational Behavior and Strategy Formulation Research: a Resource Based Analysis. Advances in Strategic Management, Vol.8, Shristava P., Huff, A., Dutton, J. (eds.). JAI Press: Greenwich, CT; pp. 39-62.
6. Barney, J., Griffin, R., (1992), The Management of Organizations: Strategy, Structure, and Behavior. Houghton Mifflin: Boston, MA.
7. Bethlehem Steel Corporation, Annual Report, 2001.
8. Brown, A.N., Brown, J.D. (1998), Does Market Structure Matter? New Evidence from Russia. Center for Economic Policy Research, Discussion Paper, No.1946, August.
9. Cockburn, I. M., Henderson, R.M., Stern, S. (2000), Untangling the Origins of Competitive Advantage. Strategic Management Journal, No. 21, pp. 1123-1145.
10. Corus Group, Annual Report, 2001.
11. COSIPA, Annual Report, 2001.
12. Dahmen, E. (1950), Entrepreneurial Activity and the Development of Swedish Industry 1919-1939. American Economic Association Translation Series, Homewood, 1970.
13. Dahmen, E. (1988), Development Blocks in Industrial Economics. Scandinavian Economic History Review, No. 36, pp. 3-14.
14. Dahmen, E. (1991), Development Blocks and Industrial Transformation: The Dahmenian to Economic Development. B.Carlsson and R.G.H. Hendriksson (eds.), Almqvist & Wiksell, Stockholm.
15. Dyer, J.H. (1996), Specialized Supplier Networks as a Source of Competitive Advantage: Evidence from the Auto Industry. Strategic Management Journal, No. 17, pp. 271-292.
16. Expert Magazine, No. 26, 2000.
17. Ferrous Metallurgy Enterprises in USSR, Reference Book, 1991.

18. Ferrous Metallurgy in the Russian Federation, Annual Report, 2001.
19. Ferrous Metallurgy in the Russian Federation, Annual Report, 2001.
20. Feser, E.J. (1998a), Enterprises, External Economies, and Economic Development. Journal of Planning Literature, Vol. 12, No. 3, pp. 283-302.
21. Feser, E.J. (1998b), Old and New Theories of Industrial Clusters in M.Steiner (ed.), Clusters and Regional Specialization, pp. 18-40, Pion Limited, London.
22. Harrison, B. (1992), Industrial Districts: Old Wine in New Bottles?, Regional Studies, Vol. 26, No. 5, pp. 469-483.
23. Heidenreich, M. (1996), Beyond Flexible Specialization: The Rearrangement of Regional Production Orders in Emilia-Romagna and Baden-Wurttemberg. European Planning Studies, Vol. 4, No. 4, pp. 401-419.
24. Holmes,John (1992), The Organization and Location Structure of Production Sub-contracting in M. Scott and A.J. Storper, eds., Pathways to Industrialization and Regional Development. London, Rout-ledge, pp. 80-106.
25. Imatra Steel Oy Ab, Annual Report, 2001.
26. International Energy Agency, Electricity Information, 2000.
27. International Metal Workers Association, Annual Survey, 2000.
28. Isaksen, A. (1997), Regional Clusters and Competitiveness: The Norwegian Case. European Planning Studies, Vol. 5, No. 1, pp. 65-76.
29. Izhora Plants, Annual Report, 1994.
30. Jacobs, D. and de Man, A.-P. (1996), Clusters, Industrial Policy and Firm Strategy: A Menu Approach. Technology Analysis and Strategic Management, Vol. 8, No.4, pp. 425-437.
31. Kaufman, A., Gittel, R., Merenda, M., Naumes, W. and Wood, C. (1994), Porter's Model for Geographic Competitive Advantage: The Case for New Hampshire. Economic Development Quarterly, Vol. 8, No. 1, pp.43-66.
32. Lavritshev, A. Economic geography of the Soviet Union, Moscow, 1986.
33. Lundvall, B. (1992), Innovation, the Organized Market and Productivity Slowdown. Technology and Productivity, OECD, Paris.
34. Lundvall, B.A. (1990), User-Producer Interactions and Technological Change. Paper presented to OECD_TEP Conference, Paris (La Vilette), June.
35. Machine-Building Metallurgy, No. 1, 2001.
36. Metallosnamzheniye i Sbyt Magazine, No. 2, 2002.
37. Metallosnamzheniye i Sbyt Magazine, No. 5, 2002.
38. Metals of Eurasia, No. 3, 2002.
39. Nelson, R., and Winter,S.(1982), An Evolutionary Theory of Economic Change. Cambridge, MA, Harvard University Press.

40. Nelson, R.R. (1993), National Innovation Systems: A Comparative Study. Oxford University Press, New York.
41. OECD database, 2001.
42. Ohmae, K. (1995), The End of Nation State: The Rise of Regional Economies. Free Press, New York.
43. Park, S.O. and Markusen, A. (1995), Generalizing New Industrial Districts: A Theoretical Agenda and an Application from a Non-Western Economy. Environment and Planning, Vol. 27, No. 1, pp. 81-104.
44. Penttinen, R. (1994), Summary of the Critique on Porter's Diamond Model – Porter's Diamond Model Modified to Suit the Finnish Paper and Board Machine Industry. ETLA Discussion Papers, No. 462.
45. Porter M. The Competitive Advantage of Nations, Houndmills, London, 1990.
46. POSCO, Annual Report.
47. Profile magazine, No. 35, 1999.
48. Rautaruukki Oyj, Annual Report, 2001.
49. Regions of Russia, Goskomstat, 2001.
50. Rothwell, R. (1992), Issues in User-Producer Relations: Role of Government. Paper for Six Countries Programme Workshop on User-Producer Relations in the Innovation Process, Espoo, Finland, November 26-27, 1992.
51. Russian Industry, Goskomstat, 2000.
52. Russian Metallurgy Industry Review, Expert Magazine, No. 26, 2000.
53. Russo, M. (1986), Technical Change and the Industrial District: the Role of Interfirm Relations in the Growth and Transformation of Ceramic Tile Production in Italy. Research Policy, No. 14, pp.329-343.
54. Smyslov, A. Mineral Wealth of Russia, 2001.
55. State Customs Committee Statistic Book, 2001.
56. State report On the State of the environment in the Russian Federation, Ministry of Natural Resources of the Russian Federation, 2001.
57. Steiner, M. (1998), Clusters and Regional Specialization. Pion Ltd., London.
58. Storper, M. (1997), The Regional World. Territorial Developments in a Global Economy. The Guilford Press, New York and London.
59. Storper, M. and Salais, R. (1992), The Division of Labor and Industrial Diversity: Flexibility and Mass Production in the French Automobile Industry. International review of Applied Economics, No. 6 (1), pp. 1-37.
60. Storper, M. and Scott, A. (1989), The Geographical Foundations and Social Regulation of Flexible Production Complexes in J. Wolsch and M. Dear, eds., The Power of Geography; How Territory Shapes Social Life. London, Unwin Hyman, pp. 21-40.

61. Transport and communications in Russia, Goskomstat, 1999.

62. von Hippel (1987), Cooperation Between Rivals: Informal Know-how Trading. Research Policy 16, pp. 291-302.