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Towards a Knowledge-based Society

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Human Development Report 2004 for the Russian Federation has been prepared by a team of Russian experts and consultants. The analysis and policy recommendations in this Report do not necessarily reflect the views of the United Nations Development Programme and the institutions where they are employed.

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This is the ninth Human Development Report for the Russian Federation. National reports such as this are published on the initiative of the United Nations Development Programme (UNDP) in many countries of the world. Global reports are also brought out annually. The reports are compiled by teams of independent experts.

The main theme of the Russian Federation Report in 2004 is "Towards a Knowledge-based Society". Human development is the key factor on the road to a new society, and Russia's economy has to effect the transition from reliance on natural resources to reliance on the most powerful renewable resource known to mankind, which is knowledge. The report highlights problems and positive trends in ongoing reforms, aimed at constructing a society based on knowledge.

The Report is intended for public administrators and businessmen, political scientists, scholars and students.

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Dear Readers,

This report, a joint initiative of the Government of the Russian Federation and the United Nations Development Programme, comprises the ninth in a series of annual Reports providing rigorous analysis of leading social, economic and environmental challenges within the framework of sustainable human development and the Millennium Development Goals. Prepared by leading Russian experts, each Report's consistent methodology facilitates statistical comparison over time.

The concept of human development forms one of the United Nations' overarching objectives, guiding the efforts of numerous agencies across multiple sectors. I am pleased to note that the Human Development Report series has helped stimulate greater focus on Russia's human capital development. The level of policy discussion and public discourse on this issue has increased unmistakeably in the federal government and State Duma, as well as regional legislatures and administrations, the academic community and civil society. Of particular note, the human development index (HDI), calculated across the regions of Russia each year by our experts, has been chosen by the Russian Government as one of the key indicators for measuring progress against national socio-economic goals and objectives .

This year's report builds a compelling case for the need and means to promote a knowledge-based society in Russia. This subject has gained considerable attention internationally as countries struggle to meet the challenges of 21st century. Humanity stands at an uneasy crossroads, facing mounting social, economic and environmental concerns. A growing consensus points to no less than the transformation of our societies and economies, through the exploitation of knowledge, as a necessary condition for sustainability. This report strives to examine human development through the lens of a society based on knowledge, in which people, their educational attainment, cultural heritage, welfare, health, and capacity for free choice, determine national potential.

In this context, the report addresses some of the most critical aspects of Russia's continuing transformation, highlighting key national comparative advantages, such as a highly educated population, extensive technology and research potential, and bountiful natural resources. Outlining mechanisms for overcoming obstacles and effectively exploiting comparative advantages, the authors make, in my view, a clear case that Russia well placed to achieve the ideals of a knowledge-based society and economy. Considerable attention is paid to the elaboration of the National Innovation System, the elimination of institutional impediments to change, and the strengthening of the human capital base. These arguments compliment the priorities of the Russian government as it continues economic and administrative reform to overcome dependence of the Russian economy on natural resource extraction and build the nation's innovation potential. Translating sustainable economic growth into human development comprises the fundamental challenge for Russia's future. As President Vladimir Putin emphasized, this growth must be driven by domestic factors, including a vibrant high-tech industry, to ensure a broadly increasing quality of life in Russia.

In conclusion, I would like to express my hope that this Report will help stimulate vibrant discussion on human development in Russia and provide users, including representatives of government, civil society and business, with a practical tool for guiding Russia along the path to a knowledge-based society.

Stefan Vassilev,
UNDP Resident Representative in the Russian Federation

To the Reader

It is my pleasure to welcome the latest Human Development Report for 2004, produced with the support of the United Nations Development Programme in the Russian Federation. This year's report centers on one of the most important challenges facing the nation today, including, as underscored by President Vladimir Putin, the need to develop an economy "based on knowledge and science."

A new economic and, indeed, social impetus in Russia remains a key condition for building a country competitive in all respects. The dynamic of innovation must be unleashed at every level, from the development of new technologies to their application across each link in the production and marketing chain. Successful innovation policy requires collaboration by all participants in the process, including federal and regional administrations, business, and civil society.

An essential foundation for the development of a knowledge-based economy, the role of education draws considerable attention and analysis in the Report. Further, significant reform of the model for Russian science is needed to ensure that the most promising research receives appropriate resources. While the state and business should cooperate to identify those opportunities most worth exploring, science and education must work together to redefine the scientific complex. A well-conceived, concerted effort can give a major impulse to further development of the Russian economy.

The challenges facing Russia today are largely those facing broader humanity in this time of rapid change. In this connection, Russia must leverage its unique cultural and scientific assets to remain a key player in the global market. Our accomplishments should be made available to all, paving the way for Russia's full integration into the world community.

The United Nations Development Programme in Russia deserves much gratitude for its work in preparing this timely report. A knowledge-based economy and society remain exceedingly vital, yet viable aspirations for our country.

Andrei Fursenko,
Minister of Education and Science of the Russian Federation

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Foreword

This is the ninth Human Development Report for the Russian Federation. National reports are published at the initiative of the United Nations Development Programme (UNDP) in 135 countries of the world. Global and regional reports are also published annually, addressing key challenges facing the international community. While Human Development Reports are commissioned by UNDP, they are compiled by teams of leading independent experts.

The 2004 Human Development Report for the Russian Federation maintains conceptual continuity with previous national reports, compiled each year by teams of independent Russian experts with assistance and support from the UNDP Country Office in Moscow. The 2004 Report, as its predecessors, constitutes an in-depth analytical study centering on a selected theme rather than a descriptive account of socio-economic development during the previous year.

The subject of focus for this year's report is formulated as «Towards a Knowledge-based Society.» While growing international acknowledgement that social advancement is to a large extent dependent on a knowledge-economy to drive social change, the development of such an economy in turn relies on human capital. To respond effectively to this global challenge, Russia must continue to restructure its economy in favor of innovation, to shift from development based on the exploitation of natural resources toward harnessing the most powerful renewable resource available: knowledge. The Report identifies both current obstacles and positive trends in the ongoing reform process in Russia within the framework of a knowledge-based economy and society.

Contributors to the Report draw largely on official statistics compiled by the Federal Service for State Statistics and official data supplied by various government ministries and departments. References are provided only when non-official sources of information or data are used. Where multiple sources of information are available, the Report cites officially published materials. For the purpose of analysing trends in contemporary public opinion, especially concerning attitudes to knowledge, results of public surveys are employed.

General Overview

The eight publication in an annual series, the 2004 Human Development Report for the Russian Federation examines perspectives, opportunities and challenges, along Russia's path "Towards a Knowledge-based Society".

The Introduction examines the essential features of such a society, as determined by the penetration of knowledge into every sphere of life, significant changes in the socio-economic structure of society, and by effective application of created knowledge. This new society makes active use of information resources, which have a number of specific features that distinguish them from traditional resources. These distinctions are examined in the Introduction.

The authors analyze possible approaches to measuring key parameters of the knowledge society and its foundation, the knowledge economy, including various methodologies for measurement using a range of proxy indicators. International comparisons across countries are made, including Russia. A broad analysis of relevant available data demonstrates that Russia's economy features several qualities fundamental to knowledge-based development. These include a high level of educational attainment, significant innovation potential and the relatively developed material and technical base of Russia's 'National Innovation System.' There are, however, a host of significant challenges to the formation of an enabling institutional environment for the knowledge-based economy, including a low efficiency of state governance and regulation of the economy, insufficient incentives for entrepreneurship, and high administrative barriers to market creation.

Chapter 1, «National Innovation System: the Basis of Russia's Knowledge Economy», considers key issues drawing from the experience of developed countries, including international comparisons of priorities and results in scientific development, levels and trends in innovation, and state research programmes and innovation policy. A National Innovation Systems (NIS) is one of the fundamental drivers of a knowledge society. In Russia, the NIS continues to endure a painful process of transformation resulting from the switch to a market economy from a centrally-planned, state-owned model. The drastic change of institutional conditions both within and exogenous to the NIS has produced crisis phenomenon. The effect of a rapid, sharp reduction in budget funding (mainly in government defense spending) has been exacerbated by the inability of the business community to initiate major innovation projects. This stems largely from the often contradictory and incomplete privatization of the economy.

While retaining a strong position in some fields of research and continuing to make contributions to international science, Russia lags behind developed countries in several ways, including the application of results, broad levels of technology, and the effectiveness of state policy in research and innovation. A market-based NIS is gradually taking shape in the country. New innovation structures are evolving, from more small-businesses to revitalized research and academic institutes, which are capable of launching commercially attractive innovation projects. Russia's chief objectives for innovation are to support the production and export of goods with high value-added while promoting a culture of entrepreneurship. The success of this strategy depends on such incentives as a differentiated tax policy for high-tech industries, the promotion of investment and the modernization of infrastructure, and measures to stimulate domestic demand.

Chapter 2, «Towards a Knowledge-Based Economy», analyzes prospects for the development of new economic drivers in Russia. Among the principal obstacles to development of a knowledge economy considered for Russia include: the prioritization of natural-resource sector development over diversified manufacturing (particularly technology-based manufacturing); a predomi-

A broad analysis of relevant available data demonstrates that Russia's economy features several qualities fundamental to knowledge-based development

nant focus on relatively short-term planning goals; insufficient valuation of human capital protection and development; a lack of continuity in science and technology; and significant contraction of the military-industrial complex, in which much of Russia's high-tech is concentrated.

Despite these serious challenges, there are clear grounds for optimism. The country's scientific and technological potential is still impressive, as demonstrated by the volume of output of high-tech products. Industrial production grew rapidly in 2003, including the relatively research-intensive branches of machine-building, such as electrical engineering, instrument making and some parts of the defense industry. Another indication of positive trends in the economy is an increase in foreign direct investment (FDI). These improvements, however, cannot be viewed as decisive. The enabling environment in Russia for knowledge generation and application falls short of that in Europe and elsewhere. This chapter reviews measures that need to be taken to stimulate development of a knowledge-based economy in Russia. It is essential that large enterprises extend vertical supply-chain linkages to help stimulate the creation and sustainability of small and medium enterprises, while the state promotes an enabling legislative, organizational and economic environment.

Despite these serious challenges, there are clear grounds for optimism. The country's scientific and technological potential is still impressive, as demonstrated by the volume of output of high-tech products

Chapter 3, «Economic Growth, Incomes and Social Differentiation», analyses challenges for Russia's advancement towards a knowledge-based society associated with the painful transition to a market economy, most notably a dramatic rise in social and income inequality. In addition to measures of income and consumption, socio-economic vitality is determined by material resources, immaterial (intangible) resources and subjective elements (e.g. individuals' self-assessment). In 2003, the first year of a return to growth in real household income, there was a significant reduction in the share of households with income below the subsistence level. At the same time, however, income inequality indicators approached their previous maximum levels of 1997–1999 – a period defined by significant national economic stress.

The income growth of recent years is analysed and compared across social strata. Growth in incomes of society's more disadvantaged groups (pensioners, the unemployed, large families, the disabled, etc.), with incomes below the minimum subsistence level, has been dependent on direct state regulation effected through indexation of minimum pensions, wages and various benefits. Much attention is devoted in this chapter to Russia's middle class, which typically constitutes a key driver for progress towards a knowledge-based society. It is demonstrated, however, that the bulk of Russians belong to a group somewhere between the middle class and the very poor. Perhaps surprisingly, the research suggests that incomes of people in this majority group are relatively little affected by economic growth.

Chapter 4, "Can Knowledge Replace People?", finds cause for concern in the demographic factor of Russia's human capital calculus. Russia has the largest population in Europe, yet its numbers have been in steady decline since reaching a peak in 1992. According to numerous forecasts, Russia can expect 30-35% fewer people by the middle of the century, with a significant rise in the average age of the population. These unfavorable quantitative changes can be offset in part by raising the quality of human potential through health improvements, increased life expectancy, and enhancement of the educational system. But these qualitative changes depend on overcoming the current negative trends in health and education. Over the last four decades, Russia has fallen increasingly behind the industrial developed countries in terms of life expectancy, a central indicator of national health and a key component of the Human Development Index (HDI). While this prolonged mortality crisis must be stopped, international evidence over the past several decades suggests that mortality reduction through the application of contemporary medical advances has its limits. Rather, significant changes in social behavior are required to impact mortality, fomenting a culture in which people take responsibility for their own health and society addresses complex challenges like the spread of HIV/AIDS with evidence-based public health approaches.

Such qualitative steps, however, are insufficient alone to overcome the demographic challenge facing Russia. Quantitative measures are also necessary to stabilize the size of Russia's population, or at least slow its

depletion. While this can be achieved to a certain extent by raising the birth-rate and reducing mortality, immigration constitutes the most effective resource, essentially limitless, for rapid response to a declining population. The task is to develop a workable immigration strategy, allowing the efficient reception and integration of immigrants into Russian society. This in turn depends on an effective and accessible educational system, the hallmark of a knowledge-based society, as the best instrument for the social integration of immigrant populations.

Chapter 5, «Education and the Labor Market», is devoted to tertiary education, a critical underpinning for the competitive knowledge economy. In line with global trends, demand for tertiary education in Russia has been growing rapidly since 1992. Considered a world leader by some formal measures, the education level of Russians reached record heights at the start of the third millennium. Impressive quantitative indicators of tertiary educational achievement, however, have yet to produce corresponding levels of economic development and material living standards. The chapter analyses possible explanations for the low efficiency of tertiary education and the overall relationship between the educational services and labor markets.

The educational system in Russia responded promptly to vigorous growth in demand for tertiary education and, furthermore, the structural adjustment of that demand: paid enrolment in state education institutions rose rapidly, and non-state education institutions entered the market. The number of specialists graduating with various types of tertiary education has been on the rise since the mid-1990s, and formal indicators suggest that the Russian workforce is already relatively highly educated. Broad standards of training at educational institutions, however, are increasingly at variance with expectations, sending distorted signals to the market and forcing the development of protective mechanisms. As well as changing the specialization structure of demand for employees with tertiary (particularly higher) education, the market is also adjusting itself to increased supply of skilled labor by reducing the "education premium" in wages.

Chapter 6, "Human Development and Intellectual Potential of Russian Regions", highlights the fact that, as a large federal state, sustainable development in Russia depends on economically strong regions and effective regional policy. One of the more pressing challenges considered is the reduction of socio-economic inequality across regions. This is critical both for economic growth and social coherence in a diverse society. As the implementation of social policy rests mainly within the mandate of regional administrations, programs to stimulate human development constitute an important part of regional policy. The Human Development Index (HDI) – its calculation, analysis, dynamics and regional differentiation, forms a framework for analysis in this chapter. The past 25 years in Russia can be generally separated into three human development periods: from 1979-1989 differentiation across regional HDIs diminished; it then increased from 1989-1994; and began to diminish again from the end of the 1990s for a majority Russian regions (with the exception of relative outliers on either end of the scale). Changes in HDI inequality between regions has resulted largely from asymmetric initial positions in terms of natural resources and differential adaptation to nascent market conditions.

Such qualitative steps, however, are insufficient alone to overcome the demographic challenge facing Russia.

The chapter divides 79 indexed regions of Russia into eight groups according to similarity of need and priorities in regional programming. An 'intellectual development index' is developed to assess the impact of knowledge on material well-being, by region. The leading positions in this index are occupied by regions with the most extensive networks of higher education and research institutions (the cities of Moscow and St. Petersburg, and the Novosibirsk and Tomsk regions) and/or a greater share of so-called "science cities" (including Moscow, Nizhny Novgorod and Kaluga regions).

As the implementation of social policy rests mainly within the mandate of regional administrations, programs to stimulate human development constitute an important part of regional policy

Chapter 7, «Intellectual Capital», discusses the fundamental role of intellectual capital as a measure of wealth in contemporary societies, and its importance as a productive asset in determining the competitiveness of national economies. Intellectual capital comprises three subgroups that interact dynamically: human, organizational and customer capital. Given their mutual dependency and synergistic relationship, imbalanced investment across the three components produces sub-optimal results. This chapter considers possible approaches

to measuring intellectual capital, including financial indicators such as the Tobin index. Non-financial estimates of intellectual capital are also proposed to assess the competitiveness of organizations, including constituent factors of that competitiveness. Intellectual capital can be estimated within the framework of a single organization, a selected region or the national economy as a whole. Such estimates help to clarify prospects for economic growth and socio-economic development in an increasingly global competitive environment.

A number of leading Russian companies have already accumulated significant intellectual capital. This, however, is far from the market standard. With a relatively deep supply of human capital, Russia has considerable potential for vigorous growth in intellectual capital. The other factors in this equation – organizational and consumer capital – remain relatively underdeveloped. Successful stimulation of these elements could produce considerable synergy, enabling rapid growth of intellectual capital in the private sector, macro-economy and society as a whole.

Effective means of addressing this problem require more efficient use of existing resources and a simultaneous elevation of education and science as priorities for state investment

Chapter 8, «Attitudes in Society to Knowledge», offers a sociological analysis of the challenge of cultivating a knowledge-based society. Of particular note, institutional transformations in the production, reproduction, and practical application of knowledge can elevate intellectual standards in Russian society only to the degree that ordinary Russians feel they have a stake in the knowledge process, are positively disposed towards it, and are prepared to translate attitudes into action. In general terms, the attitude of Russian society towards knowledge is best described as dualistic. On the one hand, society places a high value on «having an education», since people see this as crucial to their status and career prospects; on the other hand, the status of knowledge *per se*, and of those who produce and reproduce it, is relatively low. Surveys demonstrate that this dual position is typical of Russians across all levels of education – from secondary school to higher education.

Despite placing a high value on higher education, most Russians today take an essentially utilitarian attitude towards it: a good education is valued, above all, as an instrument for improving social status, material well-being, and career promotion. The acquisition of knowledge and skills becomes secondary, almost incidental. And education itself is not an attractive profession due to the low status and wages assigned to it. Effective means of addressing this problem require more efficient use of existing resources and a simultaneous elevation of education and science as priorities for state investment. This is critically important if Russia is to avoid an irreversible loss of knowledge resources as the system fails to replace current education and research personnel. A more enabling environment for private sector support of science and education, through both private-public partnerships (PPP) and charitable, or corporate social responsibility (CSR) channels also constitutes an import means of invigorating the fields of education and science.

Introduction

Over a decade after embarking on a dramatic transition in which the very structure of the socio-economic model would transform, Russia increasingly faces challenges of contemporary development shared by many countries in the world. The role that knowledge plays in unleashing a society's full social and economic potential has gained considerable currency globally among economists, political and civic leaders and other stakeholder groups. People, and the dynamics of how they interact to produce knowledge, technological advance, and even social capital now command attention as drivers in the equation of growth. But achieving a knowledge-based society requires nothing less than the generation of a knowledge culture across all spheres, including the economy – a reformulation of the context in which socio-economic transaction takes place. Knowledge is both generated and applied efficiently and updated continuously.

It would be instructive at this point to define what precisely is meant by a knowledge-based society. While a concise model or formulation has yet to be demonstrated in the literature, we endeavor in this report to illustrate the end goal and describe, through qualitative and quantitative parameters, the path towards it. The drivers of fundamental change in social capacity reside, first and foremost, in the concept of human development. To color the canvas of its future, so to speak, a society must wield a full palette. It is necessary, therefore, to embrace change across a spectrum of social institutions: the economy, education, health, science, culture, individual freedoms, gender equality, and the environment, among others. Systems and technologies for the production and dissemination of information take on a fundamental cross-cutting role.

Such a wide field of inquiry precludes a detailed investigation of every aspect within the scope of one report. The authors therefore center on what they suggest to be the principal factors for the formation of a knowledge-based society in Russia: economy and education, taken in the broadest sense. Through the prism of these sectors, the report investigates the multi-faceted challenges along the path to a knowledge-based society. The knowledge-based economy is introduced in detail first, followed in the second half of the report by the social and human development aspects that complete a knowledge-based society.

Effective formation of a new society depends to a large extent on the underpinnings of a knowledge-based economy. Knowledge has already become a significant component of most products and services in the modern world. Intellectual effort, special skills and communication not only create added value, they ensure the competitiveness and economic development of organizations at all levels. A significant share of the value of many products is created at the stage of marketing, sales, research and development (RD), and service, rather than at the stage of material production. Knowledge stimulates the emergence of new types of activity, new production methods and industries; it becomes the driving force in renovating technologies and a key factor of competitiveness and consumer well-being. Globalization and the internet revolution have witnessed an acceleration in the production of new knowledge, and the modes of activity associated with knowledge, information, and communication, are expanding exponentially.

Human development, new managerial and marketing technologies, and information systems have become the top investment priorities. The innovation cycle is shrinking, while the innovation stream becomes increasingly dense. As a result, the socio-economic structure in many countries, especially in the more developed economies, is changing. This change extends beyond the education system, scientific institutions, and government bodies, to all branches and spheres of activity.

Intellectual effort, special skills and communication not only create added value, they ensure the competitiveness and economic development of organizations at all levels

Knowledge today exerts its influence in all spheres of life and at all stages of the economic process, becoming essentially inseparable from the product or service

Modern production is, for the most part, the collaborative result of engineers, accountants, designers, personnel, sales, and marketing managers, and information technology (IT) specialists. In many enterprises and organizations effective performance depends on use of specialised knowledge, large-scale personnel training and close cooperation with enterprise partners and contractors. Knowledge today exerts its influence in all spheres of life and at all stages of the economic process, becoming essentially inseparable from the product or service. Revolutionary means of processing and transmitting information, including the use of information networks, have made actions essentially unthinkable only several decades ago into commonplace routine.

The importance of innovation has grown enormously as its source has shifted from traditional research institutions, design bureaus and R&D departments to consumers and marketing agencies. Innovation is no longer a linear process flowing from fundamental research to applied development projects and pilot production. In the contemporary innovation cycle, ideas arise as much from the market itself as from the logic of technological progress; an idea can be born, translated into a discrete concept and developed, entirely independent of the scientific research stage. While this does not detract from the importance of fundamental and applied research, these institutions play a role more clearly limited to providing a research base upon which market dynamics can take place, or addressing specific, intensive research issues. It is also important to note that fundamental and applied research now tend to be employed in a somewhat reversed order as compared to traditional practice: the results of applied projects are analyzed, and if they fail to provide a solution to the problem, fundamental research is carried out.

An increasing number of people are directly involved in the innovation process as knowledge has ceased to be a relatively independent object of economic management, limited mainly to R&D. New knowledge is not only a matter of technology, but also the implementation of innovative management methods, including market analysis, forcing a broader view of knowledge utilization. Moreover, innovation often does not imply using an entirely new product or process. Innovation *per se* also concerns products or services comprising known elements, but arranged in a new and distinct way.

Russia has yet to develop a model for performing optimally within this new context, and lacks a full picture of changes necessary at the macro and micro level to do so. The answer implies substantial changes in the structure of social production, education, and the quality and composition of the labor force. The challenge is to induce economic added value based on innovation as opposed to dependence on the exploitation of natural resources. Knowledge is, after all, the most potent renewable resource available to a society.

It is also vital to elevate human development as a top priority for Russian society, government and non-government: to breathe new life into the educational system and its network of scientific centers and institutes, to create a favorable climate for innovation, to considerably improve the institutional conditions for business and entrepreneurship, and to achieve a breakthrough in the use of modern information and communication technologies. Change is needed, not only in sectors directly concerned with the reproduction of knowledge (education, telecommunications, IT, the science and high-technology sectors), but in all branches of production that use innovation, including the 'low-technology' sectors. These objectives are predicated on a well-conceived national strategy for structural reforms, and adaptation of the capacities of various sectors for the reproduction of knowledge. Analogous strategies have been developed in many countries, providing a substantial international base of experience upon which Russia can draw.

What is a Knowledge-Based Economy?

Put broadly, a knowledge-based economy (or simply a 'knowledge economy') produces, disseminates and applies knowledge in a dynamic loop that feeds its own growth and competitiveness. It is an economic system in which knowledge enriches all industries, sectors and participants in the economic process. A knowledge economy both applies knowledge and creates it in the form of high-technology products, effi-

cient services, scientific production and education.

Strictly speaking, any society or economy – be it Babylon, ancient Egypt, the European feudal states, 18th-century Britain and France, modern African countries, or the most developed countries in the world today – is based to some degree on knowledge. The reference to knowledge, however, is particularly important for describing recent economic trends as innovation becomes comprehensive, encompassing both material and non-material assets. Innovation is now an indispensable part of renewal in every sector of the economy. The nature of information and knowledge processing has also changed. Information and knowledge are transmitted in volumes and at rates previously unthinkable, while the costs of transaction have plummeted. Hardware and software technologies enable the translation of vast quantities of previously inaccessible information into knowledge and added value. Information resources themselves have begun to play a dominant role in the accumulation of social and financial wealth.

The knowledge economy is frequently associated with high-tech industries and information and communication technologies. In fact, this is misleading. High-tech industries *per se* do not play the leading role in the modern economy. In the United States, for example, high technology represents 15.8% of industry, while industry itself represents only 18.5% of GDP. Thus, the high-technology sector contributes less than 3% of US GDP. The principal marker of a knowledge-based economy is not so much the production of high-tech products as it is the degree of application of such products across sectors. The same can be said of the role of knowledge itself in such an economy. In a knowledge economy, the generation of new knowledge is actually secondary to the more efficient, i.e. productive, use of existing knowledge. This implies a dramatic increase in the significance of learning itself.

For demonstration, we might consider an occupation like fishing that is, at first glance, quite far from science. The fishing industry, however, employs a considerable breadth of knowledge, such as hydroacoustics, radiolocation, modern navigation technology, satellite photography, advanced fabrics for nets and fishermen's clothing, hardware and software technology to locate fish shoals more accurately, etc. Even the fishing industry therefore thrives on the achievements of other science-intensive industries, which, in their turn, result from cutting-edge R&D efforts across numerous research nodes.

Knowledge by itself cannot transform an economy, nor is there any guarantee of positive return on investment in research and development and related products of higher education. Numerous countries, including such giants as Brazil, India and the former USSR, invested heavily in amassing science and technological capacity without reaping equivalent returns. A look at the complex system of institutions and practices known as a national innovation system (NIS), where scientific and technological knowledge yields are greatest, helps explain why this is so.

An NIS is a system with the following constituent elements: a) education and training organizations that produce knowledge; b) a supportive macroeconomic and regulatory framework, including trade policies that affect technology diffusion; c) innovative firms and networks of enterprises; d) sufficient communication infrastructure; and e) other factors such as access to the global knowledge base and various market conditions that favor innovation. Issues related to the creation of a national innovation system will be considered separately in the following chapter.

Russia's innovation system remains weak at the central link – large firms capable of shouldering the major financial and technological risks associated with investment in new technologies. International experience has shown that, even when small and medium business, academia, and the state fulfill their roles, large businesses emerges as the key link in the innovation network.

Further, Russia has yet to employ the institutional and economic signals that encourage significant investments in new knowledge and technology (take China, for example, where IT companies pay just 6% VAT in lieu of the standard 18% rate). Fiscal, amortization and customs preferences need to be combined with an effective institution for the protection of intellectual property in order to encourage investments in science and technology.

The challenge is to induce economic added value based on innovation as opposed to dependence on the exploitation of natural resources. Knowledge is, after all, the most potent renewable resource available to a society

Fiscal, amortization and customs preferences need to be combined with an effective institution for the protection of intellectual property in order to encourage investments in science and technology

A generally weak financial system in Russia remains another serious obstacle to innovation, as a flexible and stratified financial market can provide vital funding at early and all stages of the innovation cycle. Industrially developed countries now have mechanisms for reducing risk by distributing it more widely, creating a "knowledge market" in addition to markets for capital, commodities, services, etc.

Education and Information Resourses in a Knowledge-based Society

As well-educated and skilled people form the basis for the creation, dissemination and effective application of knowledge, a knowledge-based society depends on a comprehensive educational systems that embraces the diverse spectrum of a population. Such a system should ensure a growing share of highly skilled specialists in the workforce, while creating favorable conditions for continuous adult and professional education

Unsurprisingly, education is fundamental for the development of a knowledge-based society. It therefore follows that the theme of education will recur frequently in this report. As well-educated and skilled people form the basis for the creation, dissemination and effective application of knowledge, a knowledge-based society depends on a comprehensive educational systems that embraces the diverse spectrum of a population. Such a system should ensure a growing share of highly skilled specialists in the workforce, while creating favorable conditions for continuous adult and professional education. This encourages the creativity and flexibility necessary to adapt to the rapidly changing needs of social development and the knowledge-economy. In the globalised world, it is also important that education systems promote international recognition of qualifications and degrees from educational establishments in individual countries.

A knowledge-based society generates relatively greater demand for skilled labor. The number of workers with higher educational attainment and the economic returns to higher education have been steadily increasing in OECD countries. The share of the adult population in those countries with higher education nearly doubled, from 22% to 41%, during the period 1975-2000. Yet, even this radical shift has failed to meet rapidly growing demand for highly skilled workers.

Another feature of the changing demand for education and professional training is an increasingly shortened «life cycle» of knowledge, skills and professions. This has increased the importance of access to continuous education, regular renewal of individual abilities and improvement of qualifications. In developed countries, a model of continuous, life-long learning is replacing the traditional approach, by which people complete school, obtain a degree, and then, perhaps, undergo specialized training before starting their work life. The concept of "continuous learning for all", which was adopted by OECD education ministers in 1996, makes a new approach to education and professional training the force for knowledge-based development. Graduates are increasingly returning to the higher education system periodically, where they acquire, and update the knowledge and skills that they need in their profession. Continuous learning is a process of upgrading one's specialized knowledge and raising his or her overall educational standard to meet the ever-changing demands of the market.

Perhaps the most distinguishing feature of a knowledge-based society and economy is the wide use of information resources qualitatively unlike traditional resources, such as technology, equipment, natural resources, etc. Information resources are primarily intangible, in contrast with the material base of traditional economies. Moreover, the utility of knowledge increases rapidly as it is transmitted, multiplied and used, but has little or no intrinsic value if not applied. Traditional economic factors such as equipment and machinery, on the other hand, wear out and lose value in the process of use, but maintain intrinsic value even as scrap.

Resources in a traditional economy are usually held under private ownership, and their consumption by one consumer excludes consumption by all other consumers. In contrast, information resources are often public, or social goods, whose consumption by one consumer does not exclude consumption by others. In other words, knowledge and information are non-exclusive. As modern production increases the use of knowledge and information, it spurs greater demand for social goods. This key feature of the modern world forces us to reassess many assumptions of traditional economic theory and classical management techniques.

Traditional resources are usually of a limited physical character, while information resources, which are reproduced by people, are essentially unlimited. The Internet constitutes an excellent example of such an unlimited information resource. Multiplication and dissemination of traditional capital goods is very expensive: pro-

duction of one more car requires nearly as much labor and capital as was spent on production of the previous car. But the cost of creating the first unit is relatively small when allocated across the entire lot of cars produced (calculated as a per-unit fraction of total cost). The opposite applies in the case of information resources. As a rule, the cost of information reproduction is negligible. Therefore, issues such as the storage, codification and efficient application of accumulated information become critical to maximize value creation.

A fundamental factor in the effective use of information resources can be described as a "network interaction", i.e. the fact that units of modern technology and engineering (computers, faxes, telephones) operate jointly within a flexible framework. The value of a non-informational apparatus or device depends more on its individual qualities than on the extent to which analogous devices are in general use. The economic value of each unit in a network, however, becomes greater as the total number of such devices increases. A telephone service offers a clear example of this: the more telephone subscribers the network has (i.e. the more people, institutions and organizations that can be reached), the more value each individual telephone set commands. Here we have a sort of positive feedback where all owners of telephone sets are interested in expansion of the network, and expansion makes the network increasingly attractive for prospective subscribers. The same effect is observed in computer networks. In particular, the more nodes the Internet has, the more powerful it becomes (this is also true of many software applications).

The concept of externality effects similarly plays a large role in a knowledge-based society. As in the case of the network dynamic, externalities characterize the value of an educational system. A high level of quality educational attainment across individuals and social groups facilitates greater social cohesion, trust in social institutions, democratic participation, open debate, and appreciation of diversity in gender, ethnicity, religion, and social class. Furthermore, pluralistic and democratic societies depend on research and analysis that are fostered through social science and humanities programs. Finally, higher education, including modern evidence-based approaches, is indispensable for training health care professionals. Improved health behavior and outcomes in turn yield considerable social benefits.

Measuring the Knowledge Economy

It is instructive now to examine what types of indicators can help assess and compare the degree of knowledge economy across countries. At least two sets of indicators are available for determining a country's position along the global science and technology spectrum: science intensity (input parameters) and returns from science (output parameters, i.e. efficiency and competitiveness).

The following indicators of science intensity can be observed for Russia:

- the Russian share of R&D expenditure in GDP in 2002 (1.24%) was ahead of China (1.12%) and Italy (1.07%), but Russian R&D investment in absolute terms was somewhat behind Canada ($14,241 mln. and $17,358 mln. respectively);
- Russia has lost its former leadership in terms of numbers of researchers, now occupying third place (492,000 individuals) after the USA (1,261,000) and Japan (676,000), with China not far behind.
- Russia has 69 researchers per 10,000 employees, which is seven times more than China (10), 140% more than Italy (29), a quarter more than the UK (55), and approximately the same as Germany (67).

Key indicators for the level of returns from science are as follows:

- Russian productivity, measured as GDP per employee, was $7,200 using prices and purchasing power parity (PPP) for 2001. This is five times lower than the USA ($36,000) and 3.4 times lower than the EC (the 15 countries before May 2004);
- the competitiveness index, calculated by the World Economic Forum, places Russia in 59th place, far behind China (33rd) and India (46th), whose GDPs per capita are considerably lower;
- Russia's percentage share of high-tech in its overall exports is 3.1%, which is on a par with India, but five times lower than China and 2.5 times lower than Italy.

A high level of quality educational attainment across individuals and social groups facilitates greater social cohesion, trust in social institutions, democratic participation, open debate, and appreciation of diversity in gender, ethnicity, religion, and social class

One of the most comprehensive and constructive approaches to measuring the knowledge economy was proposed by the World Bank in the framework of the 2004 Knowledge for Development (K4D) program.[1] This approach uses knowledge assessment methodology (KAM), which assesses the degree of preparedness of a specific country for a development model based on knowledge. The KAM consists of a set of 76 structural and qualitative variables that serve as proxies for four pillars, each considered critical to the development of a knowledge economy. This approach helps countries articulate strategies to drive their transition to a knowledge economy:

- An institutional regime that provides incentives for efficient use of existing and new knowledge while promoting entrepreneurship.
- An educated and skilled population that can create, share, and use knowledge efficiently.
- A dynamic information infrastructure that can facilitate effective communication, dissemination, and processing of information.
- An efficient innovation system of firms, research centers, universities, consultants and other organizations that can tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology.

Institutional regime. This component establishes the conditions in which the economy and society as a whole develop. The extent to which the economic and legal set-up promotes creation, distribution and application of knowledge in its various manifestations remains the key issue. Measures of institutional regime in the KAM therefore examine "rules of the game", both formal and informal. They assess the ease of funding innovation projects, the degree to which education and the upgrading of skills are encouraged, how intellectual property rights are observed, etc. Reference is made to levels of tariff and non-tariff barriers, efficiency of economic regulation (based on assessment of factors such as price controls, banking regulation, openness to trade, business promotion), and the degree to which laws are obeyed (based on analysis of crime levels, etc).

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Education. The knowledge economy requires a flexible educational system and a system of continuous learning to allow people to adapt and upgrade skills throughout their working life-cycle. While continuous education can be either formal or informal, its success depends on genuine competition between educational service providers. Criteria for assessing education standards include, among others, adult literacy, and the ratio of registered schoolchildren and students to the overall number of people in that age group.

Information and communication technology (ICT). This component of the KAM reflects the number of available telephone sets, personal computers, as well as numbers of Internet users, and other similar statistics to describe the level of technology and communication use via proxy indicators.

Innovation. This grouping of indicators reflects the efficiency of interaction between business, on the one hand, and universities, libraries, research centers, laboratories, innovation centers, and various professional associations, on the other. Innovation is assessed by, among other proxies, the number of research workers engaged in R&D, the number of registered patents, and the number of articles published in scientific and technical magazines.

The K4D program also presents two consolidated indexes – the Knowledge Economy Index and the Index of Knowledge. The Knowledge Economy Index itself comprises the average of four indexes: the Index of Institutional Regime, the Index of Education, the Innovation Index and the Index of Information Technologies and Communications.

The average of three of these indexes – the Index of Education, the Innovation Index and the Index of Information Technologies and Communications – constitute the Index of Knowledge. These indexes are calculated for each country, specific regional or thematic groupings, and a global aggregate.

Table 1 presents for comparison the Knowledge Economy Index (KEI) and its components across selected countries. The countries are positioned according to their KEI ranking, with the highest scorers located at the top.

The table shows that Russia's Innovation Index score is relatively close to a number of countries that otherwise hold Knowledge Economy Index scores much higher than

Russia and enjoy a higher level of economic development. Russia also does comparatively well on the Education Index. Russia's Institutional Regime Index, however, falls disproportionately low. The same composite for European and Central Asian countries registers nearly twice as high, while Russia's Institutional Index lags below countries that are otherwise far behind Russia in the aggregate Knowledge Economy Index (particularly Brazil and Ukraine). All countries positioned in the upper section of the table have a considerably higher Institutional Regime Index than Russia. It should be noted that Russia also under performs in the Information Infrastructure Index.

(Annex to Introduction (A-I) presents a more detailed analysis of the Knowledge Economy Index, the Index of Knowledge and their constituent components. Tables showing these component indexes for Russia and other countries are featured, illustrating basic indicators of the knowledge economy, institutional regime, education, innovation, etc.)

In summary, one can conclude that the Russian economy indeed possesses a number necessary factors for knowledge-based development, from high educational levels to a comparatively well-developed material and technical basis for the national innovation system. Challenges in terms of developing an enabling institutional environment, however, hinder Russia's advance towards a knowledge economy and, ultimately, knowledge-based society. Notable aspects include: inefficient state governance and economic regulation, a lack of entrepreneurial business formation, and high administrative barriers and transaction costs. To tap its considerable potential for economic and social transformation, Russia needs to develop both the institutional foundations for a knowledge economy and the technical base, including development of a modern communication system, upon which it can flourish. The issues, opportunities and challenges, facing Russia on its path to a knowledge-based society are offered in greater detail throughout the remainder of this report.

Table I. 1.

Knowledge Economy Index and its Components

Country	KEI	Institutional Regime	Innovation	Education	Information Structure
Sweden	9.25	8.36	9.67	9.20	9.78
USA	8.69	7.81	9.47	8.43	9.03
Germany	8.38	7.95	8.88	7.87	8.82
G7 group of countries	8.29	7.68	8.69	8.26	8.52
Ireland	8.04	8.01	7.86	8.23	8.07
South Korea	7.70	6.10	7.88	7.80	9.03
Estonia	7.70	8.18	7.03	7.74	7.84
Czech Republic	6.80	6.10	6.76	7.07	7.28
Russia	5.69	2.43	7.57	7.52	5.25
Europe and Central Asia	5.27	4.03	5.51	6.56	5.00
Argentina	5.23	1.74	6.06	7.13	5.99
Brazil	5.03	3.92	4.84	5.55	5.82
Ukraine	4.92	2.49	6.03	7.82	3.33
Kazakhstan	3.62	1.55	4.08	6.30	2.56
China	3.50	2.42	4.18	3.04	4.35

[1] http://info.worldbank.org/etools/kam2004

Chapter 1.
National Innovation System: the Basis of Russia's Knowledge Economy

Russian statistics show mainly negative trends in science and innovation over the last decade. Worrying developments include reduction of the scope of scientific research, loss of human resources, and degradation of research infrastructure. Experts agree that rapid growth of the Russian economy in the last five years has been largely due to increasing exports of oil, gas, metals, and other raw materials and semi-products, and to high prices for these commodities on world markets. This sort of growth is not sustainable in the long term. In any case, raw material companies have no great need for R&D or for the wide range of technologies, which were developed in Russia during Soviet times. Investment and innovation remain weak both in the economy as a whole and in high-tech industries, threatening to turn the current technological backwardness of most Russian industries and regions into a permanent feature.

The deep crisis of Russian science and technology is due to huge changes in the external institutional conditions during transition from a centralized to a market economy. The principal changes have been: (1) sharp reduction in budget financing, mainly of military contracts, which were the basis of the innovation system in the USSR; and (2) inability of the business community, whose formation has been slowed by a contradictory and incomplete process of privatization, to start serious innovation projects. Despite this, inertia force of organizational structure and operating principals of Russian science and technology has enabled them to survive the transition period and has kept many academic schools alive. There have also been signs recently that Russian business, including oil & gas production, is becoming more open to innovation, that the state is changing its innovation policy, and that some of the country's high-tech industries are becoming more successful at globalization[1].

Creation and Use of Knowledge in Russia and Abroad

Comparison between Russia's economy and its science and technology sector and those of other countries in the 1990s showed a worsening of the situation in Russia, measured by most indicators, although Russia managed to stay among the world's top-10 countries measured by GDP (calculated using purchasing power parity (PPP)), and by such features of its national innovation system as numerical strength of the academic community, number of publications, and participation in prestigious international projects[2]. The biggest gaps between Russia and other countries are in qualitative measures, such as labor productivity, competitiveness, application of new technologies in the economy, patenting abroad, and export of high-tech products (Box 1.1 and Annex to Introduction(A-I)).

The level, trend, and structure of spending on science and technology are not adequate for Russia's current needs or for the strategic task of catching up with the world's leading countries. Russian scholars retain a prominent position in some research spheres and make a notable contribution to international scientific production, but the country is increasingly far behind both developed and developing countries in application of research, technology levels,

Investment and innovation remain weak both in the economy as a whole and in high-tech industries, threatening to turn the current technological backwardness of most Russian industries and regions into a permanent feature

Box 1.1.

According to the Institute of Complex Strategic Studies[3], Russia's cumulative innovation index is 0.59 of that of the EU, which is taken to be unity. The method of calculation and the parameters of this index are based on data collected by experts of the World Economic Forum and published in its annual reports. They show that Russia is above the average European level measured by two indicators, which are the share of new graduates working in science and technology and government expenditure on R&D as a percentage of GDP. Russia is gradually catching up with Europe measured by the ratio of innovation spending to total industrial spending and by the development level of information and communication technologies. However, it is far behind others by patent applications per million people, innovation spending in services, and the share of people with access to the Internet.

Most of Russia's state research priorities, government programs, and lists of crucial technologies are a result of lobbying power of main science and technology organizations rather than of real economic needs and real financing capacities

and effectiveness of government policy in research and innovation. The structure and priorities of financing are obsolete, and reduction of government allocations to research has not led to their rationalization. There are ways of using the available budget money more effectively to solve current socioeconomic problems and create reserves for the future.

There has been a change in public expenditure priorities in the USA, Britain and France over the last decade. These countries have reduced the share of defense-related research, and energy-sector research in total government allocations, while investment in fundamental science and medical research has rapidly increased. The draft US federal budget for 2004 in the sphere of science proposes to spend half of overall $123 billion on military projects and a half of the rest (25% of the total) on research by National Health Institutes. In addition, about $200 billion will be invested in R&D by the US private sector, mainly in pharmaceuticals, electronics, software, communications, and the car industry.

Particularly in Europe, areas of science and technology, which were strategic priorities in the 1980s – aerospace, power production, and military technologies – now rank below IT, medicine, biotechnology, and some new research avenues at the meeting points of traditional technologies. Nanotechnologies have become the top priority in all European countries.

The current structure of priorities in research spending by the Russian government is similar to that in developed countries after World War II: spending on technical sciences is much higher than on life sciences (particularly medical research). Expert assessments and polls of enterprises show that research priorities need to be changed, but government seems incapable of reacting to these findings.

The biggest share of total federal budget allocations for research purposes goes to economic research (36.6% in 2002). The share given to military research increased from 22.6% in 1998 to 29.7% in 2002.[4] But Russia is still closer in this respect to such European countries as Britain, which channels 37% of its research budget to defense, and France (23%) than to the USA (54%). However, overall spending in Russia on civilian R&D is only 0.9% of GDP, which is much less than in other developed countries, such as the USA (2.4%), Japan (2.9%), and the average in Europe (1.5%).

Most of Russia's state research priorities, government programs, and lists of crucial technologies are a result of lobbying power of main science and technology organizations rather than of real economic needs and real financing capacities. The result has been stagnation in state-run research agencies and maintenance of obstacles to development of private-sector research, which is the main engine of national innovation in all developed countries.

Comparison of patenting activity in leading countries and in Russia in 1993-2000, with reference to the eight International Patent Classification groups, showed that most patents in nearly all developed countries were in the high-tech groups, G (Physics) and H (Electricity). These two groups ranked first and second in the USA., Japan, Britain, Sweden, and Finland. In Russia, they ranked fifth and seventh, while most patents were issued for inventions related to traditional technologies. So the structure of intellectual property registration in Russia is reinforcing the country's technological backwardness.

Innovation in Specific Industries

Creation of a new type of innovation system is only just beginning in Russia. New innovation structures, capable of commercially attractive projects, are gradually developing (small business, industry research bodies and academic institutes) and are starting to receive financial support from efficient companies with large-scale investment programs.

The two main poles of innovative activity in Russia's economy are the defense industry and fuel and power. Most sciense-intensive companies are in the defense sector, but their R&D potential is under-used due to reduction of state orders, which has made it impossible to fund large-scale projects. Fuel and power are not high-tech industries, but they are among a few flourishing segments of the Russian economy, and they are building a completely new innovation model, mainly by the efforts of private fuel and power companies, which badly need to improve their levels of technology.

Technology clusters of a type not seen before in Russia have started to crystallize around some oil & gas and metallurgy companies.

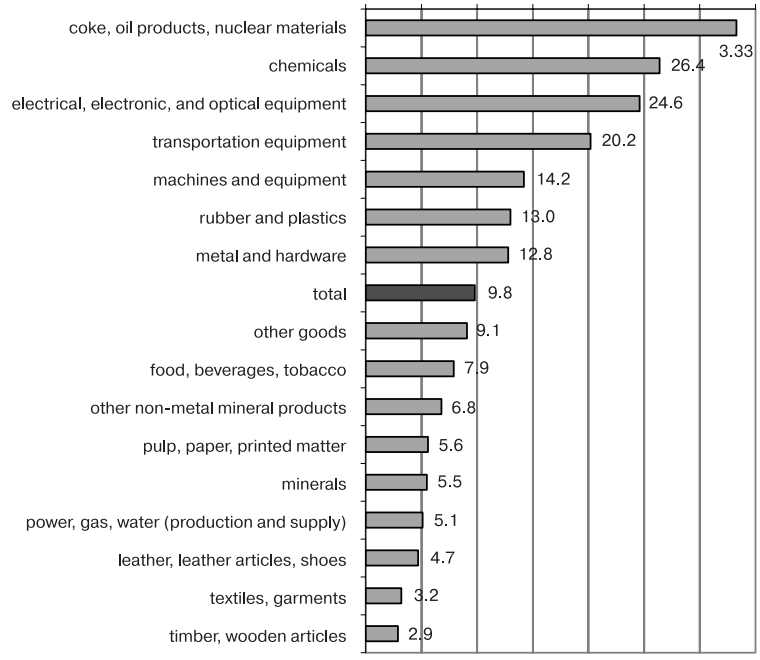
Fuel companies and nuclear power companies were the most innovative in 2002 (Diagram 1.1). The chemicals industry, which is closely related to oil & gas production, ranked second, and manufacturing of electrical, electronic, and optical equipment came third.

It also follows from Diagram 1.1 that on average only 10% of Russian companies pursued some kind of innovation activity in 2002. That compares with 25-30% in developed countries.

Higher rates were shown by independent Russian surveys that used a wider definition of innovation to bring in any equipment or technology, which a company has not used before. According to the Institute of World Economy and International Relations, 77% of companies polled in 2003 could show instances of innovation in the last 18 months using such a definition: 31% of them commissioned new equipment, 17% introduced new technologies, and 29% did both. This represents an improvement from 1997, when the result was 51%. A similar poll in 2003 by experts of the Moscow Carnegie Centre and Institute for the Transition Economy gave similar results: the innovation rate was 84%, of which equipment was 53% and technology was 31%. The respondents mentioned increase of profit and market share, and reduction in costs as main goals of innovation. Factors stimulating innovative activity were competition from imports, development of the financial system in the company's region, and quality of corporate governance. Main obstacles to innovation were financial and credit difficulties and lack of support from federal and regional budgets. Domestic competition and export opportunities were not major determinants of innovation.

The key factor in creation of an efficient innovation system in Russia is bound to be emergence of large companies, which need to continuously update their production structure in order to be competitive. Developed countries have shown that large corporations can organize key technological innovation thanks to the huge material and financial resources, which are available to them, and that such corporations are the main customers for innovation by small business. In Russia only one of the 10 biggest vertically integrated groups – AFK Sistema – operates in the high-tech sphere. All of the others are centred on oil & gas and metallurgy.

Diagram 1.1. **Innovation in Various Industries, 2002**



Source: Russian Science in Figures 2003. TsISN, 2003, p. 158 (in Russian).

The oil & gas companies, which emerged in Russia after 1991, wanted to have their own centres for applied research instead of supporting established, state-run research institutes that offer their services to all companies in the industry. Research organizations, that had been attached to distinct oil production units in the Soviet period, were privatized and incorporated to form 26 research subsidiaries, attached to various oil & gas companies. The oil & gas companies also started to use R&D capacities of new firms in IT, computer-assisted production and management, and marketing.

Research organizations, which existed at national level in the USSR, providing services to the whole oil & gas industry, have been turned into independent joint-stock companies run by the Ministry of Fuel and Power. The main source of funding for these organizations used to be budget and R&D funds, allocated to the industry. But reforms reduced the share of this source of

The key factor in creation of an efficient innovation system in Russia is bound to be emergence of large companies, which need to continuously update their production structure in order to be competitive

New innovation business in Russia is based on models used elsewhere in the world, and Russian companies have to follow global development trends, because they are now competing in a global arena

funding from 51.8% in 1993 to 21.1% in 1998.

Such large Russian oil companies as Lukoil, Yukos, and Surgutneftegaz have set up their own research complexes. For example, the declared aim of Lukoil is to be the Russian leader in oil exploration, prospecting, production, processing and petrochemicals thanks to development of innovation within the company. The company's R&D organizations design equipment for oil field management, and construction and reconstruction of facilities for oil production and processing. The company's R&D staff increased by more than four times between 1996 and 2002.[5]

The main challenge for Russian high-tech is to find a balance between competition and cooperation with foreign companies. New innovation business in Russia is based on models used elsewhere in the world, and Russian companies have to follow global development trends, because they are now competing in a global arena. Russian high-tech companies are increasingly geared to developing and selling innovations that can be applied internationally because they fit the innovation systems of other countries or regions of the world

Impact of the world market on Russian high-tech is most significant in communications, pharmaceuticals, aerospace, and IT. The impact is clearest in the telecom industry, which has seen growth rates in double figures over the last decade. Moscow now has almost as many cellular subscribers as traditional wire-network subscribers, although the wire network took nearly 100 years to develop. Foreign telecom equipment producers offer long-term trade credits to Russian cellular providers, supply equipment to Russia, assemble it on the spot, train Russian specialists, and support R&D work to adapt their products to Russian conditions in partnership with Russian research and production organizations. Intense competition between Russian telecom operators, offering up-to-date services, creates favourable conditions for innovation flow and benefits customers in Moscow and across Russia.

Another big market in Russia, which relies on high-tech, is the market for pharmaceuticals and other medical products. Research spending by pharmaceutical companies in developed countries is very large at 15-20% of total cost of sales. The Russian medical industry cannot compete with the multinationals, and has failed to seize opportunities for integration into the global network of pharmaceuticals research and production. Imports had risen to 65% of sales on this market in Russia in 2002,[6] and Russian manufacturers mainly rely on imported raw materials.

One Russian high-tech industry, which has embraced international cooperation as a way of solving its problems, is space flight. Trends in this industry are as follows:

- Despite serious difficulties during the transition period, space-flight organizations kept their science and technology capacities intact, and made a number of international alliances on both a commercial and non-profit basis. International projects include the International Space Station and Sea Start, both of which team Russian companies with leading international aerospace companies.
- In the 1990s, Russian space-flight companies built new research capacities, expanded their knowledge, and learnt the skills of international cooperation on a commercial basis, overcoming specific financial, legal, and organizational difficulties. An initial period of negotiations (1990-1993) was followed by creation of numerous JVs, and signing of contracts and sub-contracts (1994-1996), making Russia a key player in the international space-flight business.
- Western partners want access to Russian space technologies, services in land- and sea-launching of light and heavy satellites, help with rocket engine development, joint work to create and operate orbital stations, etc. These projects have given Russian space-flight companies the hard currency, which they need to survive, and enabled them to build positions on world markets. Such Russian companies as Energiya, Khrunichev, and Energomash have entered long-term strategic partnerships with Western companies.[7]
- The Russian companies started cooperation with the West as a way of maintaining their production facilities and saving jobs. But the cooperation has blossomed into major industrial alliances, extending from R&D to pilot production and full

production of high-tech articles, and including Russian companies in very promising projects.

The Russian information technology (IT) sector currently presents a mixed picture. On the one hand, the number of IT companies is increasing, and an extensive sales and service infrastructure has been set up. Already by 1998 sales exceeded $3.5 billion, which is comparable with levels in some developed countries. On the other hand, components for computers, computer networks and peripherals, and main software items are imported.

Russia has hundreds of small and dozens of large companies assembling computers, developing applications, and integrating computer systems. But they use imported equipment and components. International integration of Russia's IT sector is mainly in the form of a "brain drain" of programmers to developed countries and takeover of the most promising Russian companies by their Western competitors. Inflow of foreign capital to the Russian computer industry and export of Russian software are very limited.

Declared goals of the Russian government in the IT sector are to encourage production and export of goods and services with high value-added, and to use IT for development of national education and administration. For achievement of these goals Russia needs a new system of taxation in the IT sector (to create favourable conditions for capital accumulation), infrastructure development, and special measures to stimulate domestic demand for IT services. There also needs to be a system of state standards for teaching, training, and retraining of programmers.

Most Russian high-tech industries lack companies that are capable of exporting their products to Europe, North America and Japan, and that understand how to cooperate with foreign companies to increase sales, improve technologies, and prepare long-term development programs, which could attract investment and lead to strategic international alliances (Box 1.2).

Box 1.2.

"Creation of a favourable import-export regime for high-tech products is crucially important for development of the innovation economy. The problem is not intentional hindrance by government, or even Russia's notorious corruption, but the incompetence of many government officials, who fail to understand the issues. An application to export 1 mln tons of oil or 20 thousand tons of metal is no problem, but they do not know what to make of a request to export a light-emitting diode. And the only expert, whom they can consult, may be allied with a competitor, and therefore answer that export of such a diode is out of the question.

We have an example of how this problem can be overcome in Akademgorodok, where the deputy chairman of the Siberian Division of the Russian Academy of Sciences, Academic Gennady Kulepanov and his colleague Academic Alexander Skrinsky, persuaded the authorities to allow them to operate their own customs post. They selected customs officers and trained them by delivering dozens of lectures on high-tech products. Such specialized customs posts are needed throughout Russia. This is of crucial importance and I believe that customs authorities will support the idea."

From an interview with A. Fursenko, acting minister of industry, science, and technology (Ekspert, 16th February, 2004 (In Russian))

Innovation Policy of the Russian Government

One aspect of Russia's economic reforms has been transition from total state control of research activity to a new model, based on cooperation between private, state, and public (non-profit) organizations. But while the overall scale of scientific activity in Russia has diminished, the share of the state has remained high by world standards. The current need is for growth of non-state involvement in innovation, and efficiency improvements at state-run research organizations.

Change during the 1990s in the way the state regulated R&D and other innovative activities mainly answered to the needs of a developing market economy and followed international models. Examples are introduction of competition for research financing, new forms of organizational and economic support for innovative business, and new legislation on intellectual property. However, actual progress was disappointing: government mechanisms in Russia are highly inert, so that declared aims of the new state policy were not necessarily achieved; and legislation and its application was often inadequate and late. The state failed to solve the basic problems of improving social status of research and innovation personnel, and ensuring state funding of priority segments.

These problems strengthened conviction in the Russian innovation community that any technological advances are despite and not thanks to government efforts. Government programs often failed to improve cooperation between research institutes and com-

Declared goals of the Russian government in the IT sector are to encourage production and export of goods and services with high value-added, and to use IT for development of national education and administration

panies, and failed to stimulate private companies to invest in R&D.

However, there was a breakthrough in 2003, when the Russian Ministry of Industry and Science began a program of mega projects to overhaul state financing of R&D and to stimulate the Russian high-tech sector. The Ministry started by admitting the failure of earlier approaches. Hundreds of research themes and projects, financed from the state budget, were found to be fragmentary and lacking connection. It was almost impossible to assess their efficiency, usefulness, applicability, and the amount of value-added, which they could be expected to provide. The new plan of action was to concentrate resources on a few vertically managed mega-projects (this approach was compared in some quarters with the huge Soviet projects of the 1940s-60s).

Change during the 1990s in the way the state regulated R&D and other innovative activities mainly answered to the needs of a developing market economy and followed international models

The Ministry received about 500 applications from private and state companies and from research institutes. Only 24 of them met the main selection criteria. An expert commission then chose 11 priority directions, including such new R&D spheres as nanotechnology and projects of importance to the national economy in production of refractory and power generating equipment. In a further competition, between one and 20 applications were submitted to carry out research in each of the chosen directions, and state orders were placed for specific R&D work. Average duration of the projects is four years. The projects were mainly initiated by business in association with R&D specialists, and most of them were already at an advanced stage when state funding was awarded, so that risks of non-completion are not significant although there are risks associated with project management and ultimate marketability of the R&D results. Design, selection, and initial realization of the mega-projects match best international practice for state funding of R&D, particularly in conditions of severe budget constraint.

This suggests that Russia has finally learnt how to decide its R&D priorities no worse than other countries. However, the list of R&D challenges of national importance is long: to alter the nature of economic growth by development of innovative, high-tech clusters; to restore Russia's defense potential sufficiently to cope with security threats; to help Russian companies integrate with international science and technology programs and alliances in order to improve Russian competitiveness. To meet these challenges, the state must expand and further improve the new methods for selection and financing of R&D priorities, and must further refine its list of critical technologies (Box 1.3).

* * *

Box 1.3.

"...our limited resources mean that we must select not 10-15, but just three or four state priorities. So it is not just a question of identifying and eliminating weak or unpromising research directions, but selecting the strongest of the strong. We have to look for intersection points, where good prospects for a technological breakthrough combine with markets that will dominate the world in 10 or 15 years time. And we must make best use of our competitive advantages, both those related to our large territory and rich mineral deposits, and the immense science and technology base created in earlier years of our history – the results of huge investments in space exploration and nuclear technologies, study of materials...

Take the example of space research. This is a sphere where we still have leading positions. Combine that advantage with the natural advantage of Russia's location, and there is huge potential for synergy effect, which can generate money, e.g. by providing an intercontinental air freight corridor and using space technologies to control the traffic. The global space logistics markets offers lots of ways for us to make money: by launching tracking satellites, by installing equipment on those satellites, by supplying transponders for each cargo, by developing software for freight transportation. The same applies for atomic energy. I believe that we have a role to play in international development of hydrogen power engineering."

From an interview with A. Fursenko, acting minister of industry, science, and technologies (*Ekspert*, 16th February, 2004 (In Russian))

The principals used in changing state regulation of R&D and innovation during the 1990s were the right ones for developing a new type of NIS, following international models. But the scale of positive trends has been limited, a system for encouraging private investment in innovative activity has not been created, and budget financing is inadequate. So the goals of government science policy are not being attained in full.

Deciding R&D priorities and financing large R&D programs must become an integral part of the political, legislative, and financial activity of the state. And mechanisms are needed for reconciling the interests in R&D of different parties: heads of ministries and agencies that finance R&D, large corporate contractors, small high-tech companies, and leaders of the academic community. Effective operation of

these mechanisms will require forecasting, expert examination, and monitoring, as well as participation of academic experts in compiling lists of crucial technologies.

The key innovation tasks for Russia are to increase production and export of goods with a high value-added and to develop innovative business. For this to happen there has to be a new tax policy towards high-tech companies, which will make it possible to accumulate capital and renovate infrastructure. It is also important to stimulate domestic demand for high-tech goods.

The government science sector needs rationalization of budget cash flows, with more attention to the results of programs and projects, cancellation of programs without clear prospects, and assessment of market trends in order to optimise management and efficiency of R&D.

Deciding R&D priorities and financing large R&D programs must become an integral part of the political, legislative, and financial activity of the state

[1] In Russia, these industries are also called research-intensive, because their distinguishing feature in comparison with other industries is a higher share of spending on R&D in the cost structure, and of researchers and engineers in company personnel. According to most international classifications, such industries include aerospace, pharmaceuticals, instrument manufacturing, and the complex of industries including IT and software, electronics, computers, and telecommunication.

[2] Levels of research financing in Russia look very modest in comparison with leading developed countries, especially the USA and Japan, but they are comparable with, e.g., total research spending in Canada and the share of such spending in GDP of Italy. (Russia's GDP is close to GDP in these countries).

[3] Indicators of Competitiveness and Life Quality: An Instrument for Evaluation of Effectiveness of State Policy. Institute of Concrete Social Studies. Working Materials, 2004, no. 1, pp. 36-37 (in Russian).

[4] Russian Science in Figures, 2003. TsISN. Moscow, 2003, p. 80 (in Russian).

[5] P.M. Yukhnov. Investment Potential of Foreign and Russian Oil & Gas Companies, *Neftyanoye Khozyaystvo,* 2003, no. 11, pp. 14-16 (in Russian).

[6] *Vedomosti,* 17th February, 2003, p. 5 (in Russian).

[7] The strategic alliance between these corporations and the US company Lockheed Martin International Launch Services (ILS) accounts for a half of commercial satellite launches worldwide. In a 2002 rating by a US company in San Jose, California, ILS was judged to be thy world's best international strategic alliance.

Chapter 2
Towards a Knowledge-Based Economy

Key Factors Hindering the Development of a Knowledge Economy in Russia

The main obstacles to development of a knowledge economy in Russia at the present time are: prioritization of the natural resource sector over development of manufacturing (particularly science-based manufacturing); focus on short-term goals; failure to place proper value on human capital; lack of continuity in science and technology; excessive contraction of the military-industrial complex, in which much of Russia's high-tech is concentrated; and other adverse effects of the transition period in Russia. This chapter will look more closely at these problems.

Prioritization of the Natural Resource Economy

Production growth in the raw material sector is spurred by high oil prices. An analysis, which separates GDP growth factors into two groups — those based on direct or indirect effect of oil prices and those unrelated to oil prices, — shows the key role of oil price levels in Russian GDP growth. According to estimates by the Institute of Economics of the Russian Academy of Sciences (RAS), Russia's exports, which are overwhelmingly dominated by oil and gas, generated 77.7% of the increase in industrial production in 2003. Real household disposable incomes accounted for 15.3% of the increase, and fixed capital investment gave only 7%.[1]

The rate of growth of the whole economy is also excessively dependent on oil prices. According to World Bank estimates,[2] between 2.2 to 4.3 percentage points of the 7.2% reported GDP growth in the first half of 2003 were due to oil prices, suggesting that other factors gave only about 4.2% growth. Although these figures are only tentative, they give a fairly good idea of the degree of dependence of the Russian economy on natural resources and the prices for them, and show that economic growth is still very fragile. Unfortunately, Russian natural resource companies and many of those in government have yet to realize that unless a significant part of earnings from export of raw materials is used to develop science and high technology (as, for example, in Norway over the past two decades), there can be no question of sustainable development in Russia.

The experience of other countries demonstrates that Russia must develop its science-based (research-intensive) sector in order to achieve sustainable development. The main distinctive feature of industries that generate and disseminate knowledge, and also of knowledge-intensive industries, is a high share of value added in the goods and services, which they produce. Analysis shows a much higher share of value added in goods and services produced by the key industries of the knowledge economy compared with industry as a whole in Russia and the USA, a country with a developed knowledge economy (Annex to Chapter 2 (A-2) Table 1). So development of knowledge-economy industries in Russia can be expected to give the same positive impetus to economic growth, which it gives in the most developed countries.

Focus on Short-Term Goals and Underestimation of Human Capital

Concentration on short-term goals and neglect of the long term is a major obstacle in the way of Russia's economic development and of any rapid progress towards a knowledge-based society. Despite this adverse context, Russia has managed to stay ahead of many countries measured by several innovation indicators, but the country faces a number of extremely worrying problems.

Concentration on short-term goals and neglect of the long term is a major obstacle in the way of Russia's economic development and of any rapid progress towards a knowledge-based society

First, there has been a significant decline in R&D funding, with inevitable negative impact on continuity of knowledge. Over the last ten years, Russia has experienced an unparalleled depreciation of human capital (i.e., the knowledge and experience of researchers, engineers and specialists) and widening regional disparities as regards human capital. Russia's GDP has fallen by almost half during the

years of market reforms, but the decline in spending on science has been even more pronounced at about 2.5 times the decline in GDP. The pay levels of researchers, engineers and technicians has fallen accordingly. The low wages of highly skilled specialists in education, science and healthcare is one aspect of the huge income inequality in Russia. It is also a major disincentive for young Russians to take jobs in these key sectors of the knowledge-economy. This is particularly evident in cities and regions with major science assets (Moscow and Moscow Region, St. Petersburg, etc.) (Box 2.1). The number of people employed in R&D has continued to shrink: in 2002 it was down to 56.8% of the 1992 level, and the number of researchers had fallen by almost half (Table 2.2).

Knowledge Continuity under Threat

In 2002, 48.8% of researchers in the country, including almost 61% of candidates of science (equivalent to PhD) and more than 84% of doctors of science (above PhD), were over 50 years of age. The average age of researchers in Russia is 48 years, while average age of candidates of science is 52 years and doctors of science are 60 years old on average. This age structure is a threat to continuity of knowledge in Russian science and ultimately slows down the transition to a new economy.

The crucial problem of knowledge continuity is not being tackled effectively. Its complexity means that partial solutions offered by government agencies, big business representatives and various specialists are inadequate.

Box 2.1

Statistics for Moscow show that average wages in science are only 2.4 times and in education 1.8 times above the subsistence level (Table 2.1). Wages in some other branches of the Moscow economy (primarily finance and financial markets) are several times higher than in science or education, and even retail trade and public catering offer wages that are 66% higher on average. Naturally, young people are reluctant to go into sectors that are pivotal to the knowledge economy, because such low wages make it impossible for them to support a family.

Table 2.1

Wages by Economic Sectors and the Subsistence Level in Moscow
(January-September 2003, Moscow City Statistics Committee data)[3]

	Average monthly wage, roubles	Compared with wages in industry, %	Compared with wages in science and scientific services, %	Compared with average subsistence level in Moscow, %
Large and medium-sized enterprises, institutions and organizations in all forms of ownership, January-August 2003	11,007	104	143	343
Trading companies	38,145	362	494	1189
Credit, finance, insurance and pension provision	25,959	246	336	809
Communications	15,347	146	199	478
Retail trade and public catering	12,827	122	166	400
Education	5,746	55	74	179
Healthcare, physical culture and social security	6,597	63	85	206
Science and scientific services	7,716	73	100	240
Industry	10,541	100	137	328
Construction	12,601	120	163	393
Subsistence level				
Average subsistence level per capita in Moscow (2nd quarter of 2003*), including:	3,209.0	30	42	100
people of working age	3,629.5	34	47	113
children	3,031.6	29	39	94
pensioners	2,287.7	22	30	71

*) As established by Moscow Government Decree No. 649-PP of August 5, 2003.

Table 2.2

The decline of employment in R&D

	1992	1995	2000	2001	2002	2002 as % of 1992
Personnel numbers, including:	1,532,600	1,061,000	887,700	885,500	870,900	56.8%
researchers	804,000	518,700	426,000	422,200	414,700	51.6%
technicians	180,700	101,400	75,200	75,400	74,600	41.3%
support personnel	382,200	274,900	240,500	238,900	232,600	60.8%
other personnel	165,700	166,000	146,000	149,000	149,000	89.9%

Attempts to create structures and mechanisms adjusted to market conditions capable of optimal solutions are doomed to failure given inadequate budget funding and lack of a clear-cut government policy in the field of science and technology and, indeed, of clear-cut socioeconomic policy in general. Lack of such policy makes appeals to concentrate efforts and resources in priority areas of R&D meaningless. This conclusion is borne out by results of a survey of 150 research organizations on the main problems facing Russian science. The survey results show that the main threats to science and technology are inadequate funding and resources coupled with contradictions in the legal framework and the need for new legislation.

It is unfortunate that many people in the legislature and executive, as well as some analysts, take it as axiomatic that Russia is a poor country with a small budget. Their standard answer to any proposal for an increase in science funding is that such an increase is impossible because it would inevitably force reduction of other government expenditure items. But this approach willfully ignores potential revenues from «natural resource rent» (royalty payments for the right to exploit mineral resources), the issue of capital outflow, which regularly exceeds budget allocations for the whole of science by almost 20 times, the predatory use of «intellectual rent», etc.

And even if the state really lacked resources to improve research funding, it could resort to a practice dating back to establishment of the St. Petersburg Academy of Sciences by Peter I, who used customs and license fees to assure funding. In modern conditions, this practice could be reinvented by channeling a percentage of earnings from export of primary products (oil, gas, coal, ferrous and non-ferrous metals, chemicals, timber, diamonds, etc.) to support Russian science.

Russia's Shrinking Military-Industrial Complex

Analysis of the decline in Russian manufacturing industries connected with high technology and science (mainly engineering) is bound to emphasize that most high-technology production is part of Russia's military-industrial complex (MIC). In the past, this complex produced not only weaponry, but also sophisticated consumer goods. The MIC has suffered more than any other part of the Russian economy since transition began.

Western specialists admit that demilitarization of the Russian economy has been of great economic benefit to the USA. According to Anders Aslund, former adviser to the Russian government and currently director of the Russia and Eurasia Program of the Carnegie Endowment for International Peace, «The West had already cashed in on the collapse of the Soviet Union... All Western countries slashed their defense budgets, especially the United States».[4] Aslund estimates that the USA's gain from cuts in military spending was nearly $1.4 trillion in 1992—1999.

By contrast, losses suffered by the Russian economy due to the sharp drop in MIC production are generally agreed to be huge. A rough macroeconomic estimate of the cumulative reduction in Russia's GDP due to cuts in military spending (multiplier effect) suggests that overall loss of GDP in the ten years from 1991 to 2000 was about $400 billion.[5]

Attempts to create structures and mechanisms adjusted to market conditions and designed to find optimal solutions are doomed to failure given inadequate budget funding and lack of a clear-cut government policy in the field of science and technology and, indeed, of clear-cut socioeconomic policy in general

Grave Consequences of the Russian Transition

The problems of Russia's transition to a knowledge economy are in large part connected with the long duration and complexity of the transition period. Western economists often take diametrically opposite views on the consequences of that period for Russia. This is evident from the opinions of two economists: the above-mentioned Anders Aslund (Box 2.2) and Joseph Stiglitz, winner of the 2001 Nobel Prize for Economics (Box 2.3), quoted from their monographs on Russia.

Box 2.2

Anders Aslund, former adviser to the Russian government, on the results of economic transitions in Russia.

Russia «succeeded in large-scale privatization, although its stabilization was somewhat unsuccessful and its political changes occurred too late».[6] «However imperfect the Russian reform program, the Gaidar team did formulate a reasonably viable economic strategy that was carried out to a considerable extent, despite massive resistance from corrupt, criminal, and rent-seeking elements... Thanks to this great dispersion of political and economic power, Russia appears compelled to stay a pluralist society with a market economy. No one could plausibly concentrate all the power in Russia in Moscow again».[7]

«The social costs of the economic transition have also been wildly exaggerated. The total decline in the actual material standard of living has not exceeded 10 percent. Who could have believed that communism's demise would be so cheap?»[8]

«Today, the empirical evidence of the benefits of a radical and comprehensive reform is overwhelming. No country has suffered from too radical reforms, though some attempts at radical reform have lacked the necessary domestic or external support and thus faltered. The frequent statement that Russia suffered from too radical reform is a misrepresentation of facts. Russia undertook a brave attempt at an initial radical reform, but, unfortunately, it did not reach far enough».[9]

Optimistic Expectations: Resumption of Progress Towards a Knowledge-Based Economy

Progress Resumed

Despite the serious problems listed above, there are optimistic expectations for resumption of development towards a knowledge-based economy. Statistical analysis shows that the structure of Russia's GDP has changed significantly during the transition period, with a substantial increase in the share of the service sector. Today this sector is ahead of all other sectors of the economy in terms of volume, and production of services continued to grow in 2002—2003 (growth has been from 32.6% in 1990 and 36.5% in 1991 to 53.6% in 2002 and 53.5% in 2003).

The development of main economic indicators is presented in Table 2.3. The figures show that since 1999 the trend has been positive for virtually all indicators, with a particularly rapid increase in real wages and foreign trade. There has also been a marked reduction in export of private capital.

In 2003, industrial production grew roughly twice as fast as in the preceding year (the rate of growth was 6.8% compared with 3.7% in 2002). Weighted-average growth rates in export-oriented natural resource industries were roughly 1.4 times higher than in industries oriented towards the domestic market.

Box 2.3

Joseph Stiglitz, winner of the 2001 Nobel Prize for Economics, on the results of economic transitions in Russia.

«For the majority of those living in the former Soviet Union, economic life under capitalism has been even worse than the old Communist leaders had said it would be. Prospects for the future are bleak. The middle class has been devastated, a system of crony and mafia capitalism has been created, and the one achievement, the creation of a democracy with meaningful freedoms, including a free press, appears fragile at best, particularly as formerly independent TV station are shut down one by one. While those in Russia must bear much of the blame for what has happened, the Western advisers, especially from the United States and the IMF, who marched in so quickly to preach the gospel of the market economy, must also take some blame. At the very least, they provided support to those who led Russia and many of the other economies down the paths they followed, arguing for a new religion — market fundamentalism — as a substitute for the old one — Marxism — which had proved so deficient».[10]

«Liberalization and stabilization were two of the pillars of the radical reform strategy. Rapid privatization was the third. But the first two pillars put obstacles in the way of the third. The initial high inflation had wiped out the savings of most Russians so there were not enough people in the country who had the money to buy the enterprises being privatized».[11]

«Privatization, accompanied by the opening of the capital markets, led not to wealth creation but to asset stripping. It was perfectly logical. An oligarch who has just been able to use political influence to garner assets worth billions, after paying only a pittance, would naturally want to get his money out of the country. Keeping money in Russia meant investing it in a country in deep depression, and risking not only low returns but having the assets seized by the next government, which would inevitably complain, quite rightly, about the «illegitimacy» of the privatization process».[12]

«Russia had quickly been transformed from an industrial giant — a country that had managed with Sputnik to put the first satellite into orbit — into a natural resource exporter; resources, and especially oil and gas, accounted for over half of all exports».[13]

«...It was expected that Russia would be spared the inequality arising from inherited wealth. Without this legacy of inherited inequality, there was the promise of a more egalitarian market economy. How differently matters have turned out! Russia today has a level of inequality comparable with the worst in the world, those Latin American societies which were based on a semi-feudal heritage. ...And the prognosis for the future is bleak: extremes of inequality impede growth, particularly when they lead to social and political instability».[14]

Table 2.3

Main Economic Indicators
(as % of 1990, data of the State Statistics Committee and Central Bank of Russia)

Indicator	Year									
	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
Population	100	99.6	99.3	99.0	98.7	98.3	97.8	97.2	96.6	...
Average number of employees	100	88.2	87.6	85.9	84.7	84.9	85.4	85.9	86.5	88.1
Average monthly real gross wage	100	43.2	45.8	48.1	41.9	32.6	39.5	47.4	55.0	60.7
Gross domestic product	100	62.1	60.0	60.5	57.5	60.7	66.1	69.4	72.7	78.0
Industrial production	100	49.7	47.2	48.2	45.8	50.8	56.9	59.7	62.1	66.5
Agricultural production	100	67.0	63.6	64.5	56.0	58.3	62.8	67.5	68.5	69.5
New residential construction	100	66.8	56.1	53.3	50.1	52.1	49.5	52.0	55.5	59.5
Freight transport	100	59.9	56.9	55.2	53.6	56.2	59.1	60.8	64.5	69.2
Passenger transport	100	66.4	61.7	59.9	56.3	58.0	60.3	59.1	58.7	60.4
Retail turnover	100	91.1	91.4	95.8	92.6	86.9	94.6	104.7	114.3	123.5
Paid consumer services	100	24.2	23.0	24.4	24.1	25.8	27.1	27.9	29.0	30.5
Fixed capital investment	100	30.7	25.2	23.9	21.0	22.1	25.9	28.5	29.3	32.9
Foreign trade with non-CIS countries	100	71.3	77.1	79.7	66.5	60.0	79.1	82.4	89.1	111.5
Domestic R&D expenditures	100	15.1	16.6	18.0	15.6	17.3	19.8	23.0	25.8	28.6
Net export of private capital (1994=100)	...	27.1	165.3	126.4	150.7	144.4	172.2	104.2	56.3	20.1
Ratio of net export of private capital to domestic R&D expenditures (at official rouble/dollar exchange rate)	...	1.5	6.4	4.3	8.5	10.7	9.1	4.2	1.9	0.5

Table 2.4

Rate of Industrial Production Growth (Decline) in Russia, 1990—2003

Industry/Year	1991—1995 average annual % change	1998—2001 average annual % change	2002 annual % change	2003 annual % change
Industry — total	– 13.1	5.5	3.7	6.8
Electric power industry	– 4	0.2	–0.7	1.0
Fuel industry, including:	– 7	2.4	7.0	9.3
gas industry	–3	1.3	3.0	5.2
oil production	– 7	3.3	9.0	11.2
oil refining	–8	–0.1	5.0	2.0
Ferrous metallurgy			3.0	8.9
Non-ferrous metallurgy			6.0	6.2
Chemical industry, including:	–13	9.2	1.6	4.4
synthetic resins and plastics	–16	15.4	3.8	4.7
basic chemicals	–9	7.2	2.4	2.1
synthetic dyes	–16	14.6	–8.3	–6.8
plastic products	–15	1.6	7.8	8.9
photochemicals	–21	25.2	...	...
household chemicals	–10	12.3	...	...
Petrochemical industry	–16	9.2	...	...
Engineering and metalworking	–17	8.1	2.0	9.4
Engineering, including:	–17	6.5	...	...
materials-handling	–20	7.9	–9.9	–7.7
railway	–15	6.8	21.7	35.8
chemical	–16	17.1	–17.8	–7.0
electrical	–23	13.6	–6.2	5.5
instrument-making	–13	12.1	9.1	44.8
engineering for light, food and household appliance industries	–19	5.3	15.9	6.6
machine tool industry and tool making			–18.3	0.5
communication industry, including television sets	74.6	77.9	18.0	18.0
automobile manufacturing	–13	2.0	2.2	6.0

High growth rates in 2003 were observed in the fuel industry (9.3%) and ferrous metallurgy (8.9%), which are both geared to raw materials and semi-products, but also in engineering and metal-working (9.4%), which is undoubtedly a positive trend.

There have also been some specific positive changes promoting development towards a knowledge economy: several research-intensive branches of engineering experienced growth in 2003, including electrical engineering, instrument making and some MIC industries producing not only military, but also civilian products. The share of civilian products in MIC output has increased significantly in recent years, as indicated, for example, by substantial increase in manufacture of household appliances and communication facilities (Table 2.4).

However, this reversal of negative trends cannot yet be regarded as long-term, since rates of growth of industrial production tailed off in 2002 after the boom in 1998—2000. Another point to note is that today's fairly high rates of industrial growth are still insufficient to offset the decline recorded in 1991—1995: industrial production declined at an annual rate of 13.1% in 1991—1995 whereas annual growth rates in 1998—2003 barely exceeded 5%, (see Table 2.4 and Annex (A-2)Figure 1).

Transition to a knowledge-based economy is predicated on increase of total investment in the knowledge sector

High Potential of the Russian Knowledge-Economy Sector

Transition to a knowledge-based economy is predicated on increase of total investment in the knowledge sector. Today total investment (financing) in this sector is calculated as the sum of expenditures on R&D, higher education (from private and public sources) and software. Statistical analysis shows that average investment in knowledge in the late 1990s for all countries of the Organization for Economic Cooperation and Development (OECD) was about 4.7% of GDP (inclusion of all education spending raises the level to over 10% of GDP). The figures were highest in the USA, Sweden, South Korea and Finland (5.2—6.5 % of GDP), and lowest in Mexico, Greece and Portugal (under 2% of GDP).

Rigorous investigation of the knowledge sector in Russia is still at an early stage. It is hindered by complexities of the transition period, and also by weakening of the state reporting system (suffice it to say that monitoring of science by Russia's State Statistics Committee is the responsibility of the small Department of Science and Ethics Statistics, whose name indicates that it also deals with problems, which have nothing to do with the knowledge economy). For these reasons, the estimates used today may be approximate, although the errors are probably not very significant. Table 2.5 gives a comparison of investment in the knowledge sector in OECD countries and in Russia for two definitions of the knowledge sector: one including higher education, and the other including all levels of education (here and below, data for foreign countries are based on OECD estimates, and data for Russia are based on estimates made by the Central Economics and Mathematics Institute of the Russian Academy of Sciences).

Although the estimates for Russia are approximate, they are sufficient to show that the ratio of investment in the knowledge sector to GDP is two or three times lower in Russia than the OECD average. Inputs to the knowledge sector in such countries as the USA, Sweden or South Korea are 10% to 30% above the OECD average, so the gap between Russia and these countries is even wider. Support for knowledge in Russia is clearly far below the average level for Europe and the world.

Table 2.6 presents estimates of value added generated by knowledge-intensive industries as a percentage of GDP in the most developed countries.

Table 2.6 shows that in the late 1990s the highest share of value added by the knowledge-intensive sector (without education and healthcare) as a percent-

Table 2.5

Investment in the Knowledge Sector (as % of GDP)

Knowledge sector composition	OECD countries (2000)	Russia (2002)
Higher education, R&D and software development	4.7	1.8
All education, R&D and software development	>10	5.0

Table 2.6

Contribution of Knowledge-intensive Industries to GDP (Value Added as a Percentage of GDP)

Country	Year	High and medium-high technology industries	Telecom munications	Financial and insurance services	Business services, including R&D	Total	Education and healthcare	In all
		j = 1				j = 2		j = 3
USA	1998	8.5	3.4	8.3	9.8	30.0	11.6	41.6
Japan	1998	10.7	1.9	5.2	7.0	24.8	...	...
France	1998	7.4	2.1	4.7	12.3	26.4	11.7	38.1
Germany	1998	11.7	2.4	4.8	12.1	31.0	10.3	41.2
Italy	1998	7.2	2.1	6.0	7.9	23.3	9.5	32.8
Portugal	1997	4.4	2.9	5.8	...	...	11.9	...
Spain	1998	6.4	2.7	5.3	5.5	19.9	10.1	30.1
Sweden	1998	10.0	2.8	3.5	8.5	24.8	...	...
Great Britain	1998	8.1	2.8	5.9	11.2	28.1	11.6	39.8
South Korea	1998	12.6	2.3	7.0	4.2	26.1	7.8	33.9
Mexico	1998	8.3	1.5	3.0	5.7	18.5	8.7	27.1
Switzerland	1998	11.5	2.7	14.3	7.5	36.0	...	...
EU countries	1998	8.4	2.4	5.3	10.0	26.1	10.9	37.0
OECD countries	1998	8.8	2.7	6.5	9.0	27.0	...	...
Russia	1999—2000	5	1.6	3.0	1.8	11.4	5	16.4
EU countries/Russia		1.68				2.29		2.26
OECD countries/Russia		1.76				2.37		...

age of GDP for the j=1 set of knowledge-intensive industries (high and medium-high technology industries) was recorded in Germany (11.7%) and Switzerland (11.5%). For j=2 (adding telecommunications, financial and insurance services, and also business services including R&D) the highest share was in the USA (30.0%), Germany (31.0%) and Great Britain (28.1%). And for j=3 (adding education and healthcare) the total share of gross value added in GDP was over 40% in the USA (41.6%) and Germany (41.2%).

Table 2.6 also compares the level of knowledge use (translation of knowledge inputs into knowledge outputs) in Russia with that in the OECD and EU, and shows that it is approximately 1.7—2.3 times lower depending on the range of industries considered, although it is worth noting that knowledge use in high technology (j=1) is significantly higher than for a wider range of industries (j=2 and 3).

These data show once again that the labor of people employed in science and education is currently undervalued in Russia and that funding for these sectors is low. The figures for Russia approach those for countries, which are under-developed in science, technology and education.

Nevertheless, Russia's huge scientific and technological potential and high education standards still hold out hope for major acceleration of the transition to a knowledge-based economy, if the state can implement appropriate economic, industrial, science and technology policies.

High-Technology Achievements in Russia

Figures for high-technology production by industry and for aggregate production of high-technology products and services in Russia are also encouraging. In terms of these indicators, Russia ranks 8th and 12th, respectively, among developed countries (see Table 2.7).

Despite its economic crisis of the 1990s and slow recovery, Russia has a number of unique high technologies and is still capable of world-class scientific achievement. We give three examples below. Two of them relate to dual-purpose (military-civilian) technologies: construction of floating nuclear power plants and heavyweight air cargo transportation. The third example — the project for a national technology park, developed by a team of Russian and German specialists led by Zhores Alferov, winner of the Nobel Prize for Physics — is evidence of the high level of research conducted in Russia (Box 2.4).

Table 2.7

Russia's Place Among Developed Countries

(a) in terms of production of high-technology products and services;
(b) in terms of production of high-technology products (authors' estimates)

Rank	Country	High-technology products and services, $ billion, 1999	Rank	Country	High-technology products, $ billion
1	USA	2,584.0	1	USA	731.9
2	Japan	1,377.2	2	Japan	594.4
3	Germany	807.9	3	Germany	304.8
4	France	450.1	4	France	126.1
5	Great Britain	356.5	5	Great Britain	103.1
6	Italy	272.7	6	Italy	84.2
7	Korea	148.2	7	Korea	71.4
8	Canada	142.5	8	**Russia**	50.6
9	Spain	134.8	9	Canada	49.0
10	Netherlands	124.4	10	Spain	43.4
11	Switzerland	117.3	11	Switzerland	37.4
12	**Russia**	115.3	12	Netherlands	29.6
13	Sweden	66.6	13	Mexico	28.9
14	Mexico	64.7	14	Sweden	26.9

Box 2.4

Floating Nuclear Thermoelectric Power Plant (FNPP) Based on Nuclear Submarine Technologies

Next year Russia will start construction of a floating NPP based on technologies used in nuclear submarines. SevMashPredpriyatiye in Severodvinsk, Russia's biggest builder of submarines, is to be the lead contractor. Construction of floating NPPs will enable SevMashPredpriyatiye to convert from military to civilian production.

The FNPP is a floating power unit, a non-self-propelled vessel equipped with two reactors designed to generate electric and thermal power and with necessary infrastructure. It is 144m long, 30m wide, with draft of 5.6 m, and has expected service life of 40 years. Cost of construction is $150-180 million. The FNPP's generating capacity will be 70 MW, and its heat output will be 140 Gcal per hour. This is sufficient to meet electric power and heat needs of a town with population of about 200,000 or of a very large enterprise.

The Russian Atomic Energy Minister, Aleksandr Rumyantsev, has said that the first floating NPP may be built in Severodvinsk within the next three years. FNPPs will be particularly useful in remote northern and eastern regions of Russia, where transport costs represent up to 60% of the price of fuel. There has also been interest from China, India, Thailand, Indonesia, and countries of the Persian Gulf and North Africa, which would use the floating NPP to desalinate water, as well as to produce electric power.

Aleksandr Rumyantsev said that offshore NPPs can be transported to any part of the world on ships or on special platforms similar to oil platforms. FNPPs used abroad will remain Russia's property and will be provided on a lease basis.

The FNPP project is highly attractive to investors: the payback period, including the construction period, does not exceed eight years. However, there is still a problem of reluctance of Russian investors to put their money into government projects.[15]

The World's Largest Airplanes for Carrying Super-Heavy Cargo

Three Russian and one Ukrainian airline own AN-124 Ruslan air freighters with payload capacity of up to 120 tons, which they use for charter transport of super-heavy and outsized cargo. One of these companies, Volga Dnepr Airlines, has international market share of over 50%. Initially developed for purely military purposes, the Ruslan surpasses the USA's outsized cargo transport, the C5 Galaxy.

Volga Dnepr's aircraft fleet consists of nine AN-124-100 Ruslans, three Il-76s and five Yak-40 aircraft. The company's turnover in the first 10 months of 2003 was $186.6 million, and it has over 1300 employees. Volga Dnepr has divisions in Britain, the USA, Ireland, the United Arab Emirates and China, and its customers include such companies as General Electric, British Petroleum, Lockheed Martin, Hughes, Bombardier and Alcatel. Volga Dnepr has also done much work for international organizations: since 1992 the company has performed airlift operations for UN humanitarian and peacekeeping missions, in 1994 it obtained the status of official UN carrier, and in 1995 it was entered on the list of key service providers for UN missions. In December 2001, Volga Dnepr was the first airline to begin flights to Kabul after the start of the anti-terrorist operation. The company has made over 250 flights to Afghanistan and has airlifted about 15,000 tons of cargo from Europe, North America and Australia.[16]

The Worldwide Dialogue Technology Park in St. Petersburg

A team of Russian and German specialists led by Academician Zhores Alferov, winner of the 2000 Nobel Prize for Physics, has developed a project for creation of a national technology park in St. Petersburg. Estimated cost is 1.5 billion euros. If the project goes ahead it will help Russia to make significant progress in microelectronics over the next few years.

Only 20 years ago the Soviet electronic industry ranked third in the world in terms of production volumes, although it lagged the USA and Japan by a large distance. After the breakup of the USSR, the Russian industry remained stuck at mid-1980s technology levels, and the switch to integrated circuits with smaller dimensions requires a radical change in technology. New plants can augment state-of-the-art technologies applied in silicon electronics with specifically Russian achievements in the field of semiconductor heterostructures. The citation index for heterostructure researchers at Russia's Joffe Physico-Technical Institute is extremely high. According to Alferov, Siemens, Samsung and others major corporations, including some in the USA, are currently taking their lead from Russian research.

German partners are prepared to undertake construction of the new technology park, to supply equipment and technologies, and to raise borrowing without laying claim to ownership, provided that the Russian government gives guarantees for 15% of the total cost of the project. The estimated payback period for the technology park is 6-8 years. The Germans propose selling 25% of production from the park through their own networks at world prices.

As Alferov says, Russia is currently better at trading oil than microelectronics, but oil reserves will not last forever and one gram of laser heterostructure is equivalent in price to 10 tons of oil, while chips produced on a single 300 mm wafer are equivalent to 40 tons of oil.[17]

Growth of Foreign Investment

Another indication of positive trends in the economy is the significant increase in fixed capital investment, which was 11.9% in the first half of 2003. That is much higher than figures for the previous two years (2.6% in 2002 and 8.7% in 2001), even though the level in 2000 (17.4%) has not been repeated. Meanwhile, outflow of capital from Russia in 2003 is expected to stay below $6-7 billion. Even if the figure reaches $10 billion (pessimistic estimate), it will be much lower than in previous years.

Foreign investment in the Russian economy more than doubled in January-September 2003 compared with the same period of 2002, reaching $20.9 billion (full-year figures were $12.4 billion in 2002, $14.2 billion in 2001, $10.9 billion in 2000, $9.6 billion in 1999, and $7.8 billion in 1998).

It is important to note a big increase of capital inflows in recent years from small countries such as Cyprus, the Virgin Islands, Luxembourg, etc. At the end of 2003, the share of these three countries alone in the total stock of foreign capital in Russia was 23%.[18] In 2001, Cyprus took the biggest share of foreign investment with 16.3%, nearly a third higher than the USA's 11.2% and nearly twice as high as Germany's 8.7%. This evidently points to increasing return of Russian flight capital from abroad. However, analysts of the rating agency, Standard & Poor's, still judge that low diversification of the Russian economy and its increased dependence on the movement of oil prices are an obstacle to upgrade of Russia's credit rating.[19]

Incentives to Develop the Knowledge Economy

Societies in developed countries are beginning to realize that the knowledge sector provides the key to solution of many socio-economic problems. These problems are diverse and numerous, so the knowledge sector has to be flexible, dynamic and economically efficient. Russia still needs changes in public consciousness before it can move successfully in this direction. We have to understand that the source of wealth is in the human mind, and not under the earth, and that the knowledge sector must be well paid for its contribution to problem solving. Large companies must learn to create and patronize small companies and enterprises (including outsourcing, venture financing, etc.), and the state must create a favorable environment both as regards legislation (protection of authors, designers, consultants, teachers and researchers) and economics (tax breaks for investors in knowledge). It is important for Russia to train and foster innovation managers and to develop an institutional environment that can select, assess and monitor promising projects.

State programs for transition to a knowledge-based economy need to include the following:

- tax incentives for high-technology business, support and preferential terms for enterprises engaged in high-technology activities;
- a system of incentives to encourage investment in the knowledge economy, creation of a mechanism for high-risk investments;
- support for export of research-intensive products and services (guarantees, insurance, etc.);
- protection of small business;
- formulation of short- and long-term plans for development of the knowledge economy;
- guaranteed funding of basic research;
- appropriate conditions for development of public education and information activities;
- a system of incentives to encourage innovators through target funding;
- a system of statutes and regulations helping, on the one hand, to protect copyright and, on the other, to disseminate new knowledge and enhance its social impact (in particular, amendments should be made to legislation on intellectual property in order to protect the interests of authors, inventors, researchers and designers).

Moral support and recognition of the achievements of Russian scientists, researchers, engineers and specialists is very important, and the same attitude

We have to understand that the source of wealth is in the human mind, and not under the earth, and that the knowledge sector must be well paid for its contribution to problem solving

should be extended to research, development and engineering organizations and the country's scientific and technological potential as a whole. Reputation played a major role, for example, during the Renaissance, when scientists were awarded titles that endowed them with social status.

It is natural that the Russian Academy of Sciences (RAS) should play an important role in progress towards a knowledge-based society

It is natural that the Russian Academy of Sciences (RAS) should play an important role in progress towards a knowledge-based society. Steps that could enhance the role of the RAS include: more flexible forms of organization, including innovation firms subordinated to the RAS; adding educational activity to the list of key activities in the RAS Charter, with academic universities regarded as one of the main organizational forms; separating the functions of research director and executive director; result-based assessment of projects in conjunction with more flexible financing (a combination of grants, government orders, joint contracts and core funding), etc. It is important that basic state funding of the RAS should be viewed as recognition of the Academy's reputation and not as payment for government procurements.

Current under-funding of science, if it continues, could slow down economic growth by the end of the first decade of the 21st century

Analysis of the present state of Russian science and technology, and forecasts for the future, show that urgent measures are needed during the current decade (i.e. by 2008—2010) to avoid major loss of potential as the older generation retires leaving insufficient younger specialists to continue their work. Current under-funding of science, if it continues, could slow down economic growth by the end of the first decade of the 21st century. That would entail a technology gap in Russia, making it impossible to ensure the country's security, thus posing a threat both to Russia itself and to global stability in general.

Preservation and further development of the country's scientific potential is a key condition for sustainable growth of the knowledge economy in Russia. Development of Russian science requires: retention of a wide range of research areas (given Russia's huge size, long borders, large population, sizeable economy, high scientific and technological potential, and specific geopolitical position); ensuring continuity of scientific knowledge through support for highly-skilled researchers (both young and mature); compliance with key norms and standards in sector financing (total spending on science as a share of GDP, the ratio between wages in R&D and the average wage in the economy for young researchers, etc.); incentives for priority R&D, similar to those used in developed countries, based on percentage changes in allocated financial resources (instead of changes in absolute amounts) in order to preserve scientific potential, at least in part, in non-priority areas, which are nevertheless important for developing the scientific environment in the country; significant federal support for science, since sectoral (industrial) science will evidently be in need of substantial government funding for the next five to seven years; special legislative acts providing for additional spending on science in science-based cities and regions; a review of the tax code in order to extend government support for science; strengthening of information support for science; and many other measures to take account of long-term trends in the R&D sector.

* * *

Long-term changes in the quality of Russia's economic growth (raw materials versus knowledge) are crucial for programs of reform and transition to sustainable development. Russia also needs to take account of the latest trends in the world's leading countries as they move towards a knowledge economy. Establishment of a knowledge economy is the key factor for sustainable economic growth.

Russia has the potential for switching to a new type of economic development. International experience shows that successful development of the knowledge-based economy depends on design and implementation of an appropriate policy by the state. There also needs to be adequate understanding of Russia's problems and real support from advanced countries. Russia's future depends on how soon Russian science and high technology receive a new impetus to development after a decade of transition recession, an impetus that will ensure Russia's long-term involvement in worldwide innovation.

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[2] *Russian Economic Report.* The World Bank, Russia Country Department, No. 6, August 2003.

[3] http://www.mosstat.ru/info.php#

[4] A. Aslund, *Building capitalism, Cambridge University Press,* 2001, p.400.

[5] A.Ye. Varshavsky, «Considering Economic Estimates on Solving the Problems of Global Stability», Ekonomika I Matematicheskiye Metodi, vol. 38, No. 1, 2002.

[6] A. Aslund, *How Russia Became a Market Economy,* The Brookings Institution, Washington, D.C., 1995, p. 293.

[7] *ibid.*, pp. 311—312

[8] *ibid.*, pp. 313—314

[9] A. Aslund, *Building capitalism, Cambridge University Press,* 2001, p.445

[10] J.E. Stiglitz, *Globalization and Its Discontents,* W.W. Norton & Company, New York, London, 2002, pp. 133—134

[11] *ibid.*, p. 143

[12] *ibid.*, p. 144

[13] *ibid.*, p. 152

[14] *ibid.*, pp. 154—155

[15] http://www.pravda.ru/,http://invur.ru/, *Russki kuryer,* No. 174, December 19, 2003, Profil, No. 44 (363), November 24, 2003

[16] *Sekret firmy,* No. 22 (38), December 1 — December 14, 2003.

[17] *Rosiiskaya gazeta,* December 22, 2003.

[18] *Russki kuryer,* December 11, 2003, p. 1.

[19] *Russki fokus,* No. 45 (127), December 22, 2003 — January 18, 2004.

Developing a Knowledge-based Economy

Introduction

A knowledge-based economy is characterized by its focus on innovations, research and development and the use of new technologies. The need to find new and sustainable sources of economic growth is the principal driving force behind the growing interest in developing knowledge based economies. A number of international organizations are ranking economies' knowledge-base by using indicators of new technology penetration (mobile phone, computer, Internet), research and development expenditure, the number of patents per capita and various education and research measurements. Sweden, together with its Nordic neighbors, often scores quite well in these benchmark studies and may therefore be an interesting case study.

The key challenge for policy-makers in developing a knowledge-based economy is to create an environment with strong incentives for the innovative market players to invest and do business in and, at the same time, ensure the market is supplied with the right human capital. We will take a closer look at this challenge by studying two underlying dimensions – government policies and human capital – that are pivotal to a knowledge- based economy.

Table 1

World Economic Forum Innovation and Competitiveness Ranking

	Technology Index		Innovation subindex		ICT subindex		Technology transfer subindex	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Russia	69	3,61	27	3,36	56	3,66	69	3,62
Sweden	4	5,9	4	5,52	3	6,28	n.a.	n.a.

Source: World Economic Forum (2004): "Global Competitiveness Report 2003-04"

Sweden will be used as a case study and references to Russia will be made throughout the study. The conclusions in a recently published benchmarking analysis of the Swedish national innovation system during the last three decades offer a good point of departure as it deals both with Sweden's apparent successes and with the challenges in maintaining and improving the knowledge based economy for the years to come:

- *The financing and incentive structures of the Swedish national innovation system have primarily been geared towards stimulating productivity improvements and growth in large manufacturing groups."*
- *General tax structures, labour market structures, public attitudes and public-private partnerships have all been rather stimulating to large-firm capital accumulation and growth in Sweden."*
- *The general incentives for starting firms and generating SME growth in Sweden have been much weaker. Moreover, the pre-seed and the earliest seed-stages financing of R&D-based start-ups have remained low and even decreased in Sweden in recent years."*
- *The Swedish support structure for stimulating commercialisation of R&D through start-ups and growth of such firms is fragmented, nationally and regionally."*
- *The general incentive structures in the publicly funded and highly university-based Swedish research system do not provide strong incentives for knowledge interaction and learning between university researchers and businesses or public sector services."* [1]

The report gives a comprehensive account of the competitiveness, structure, performance and continuous development of the Swedish innovation system, including its research and development (R&D) structure, human resources, technology and science performance, financing and incentives structure. A reoccurring conclusion is that the policy in all these areas has mainly been focused on the largest manufacturing companies. The resulting challenge for the future Swedish innovation policy is two-fold. Sweden needs, on the one hand, to adopt the existing policy to the present situation in which an increasing share of production is taking place outside Sweden and more and more emphasis is being put on services. Secondly, and perhaps most importantly, the policy need to put a lot more focus on the conditions and incentives for small and medium sized enterprises (SME:s) and entrepreneurs. Although Russia may be at a different stage in the development of its knowledge-base, we believe Russia faces a similar challenge with regards to SME development.

The Policy Dimension

It is not possible to administer growth or innovation, but the government can create an environment in which innovative companies and individuals prosper and grow. Such an environment includes factors related to the general business environment, such as regulations and taxes, but also to specific innovation policies and government commitment to new technologies and education. This section will take a closer look at these factors in general and the Swedish innovation policy in particular.

The Regulatory Framework

The role of regulations in a country's business environment cannot be overstated. The overall regulatory burden of countries around the world is measured by a number of international organizations using a set of indicators related to the business environment. The Heritage Foundation, for example, argues that the regulatory burden in Sweden is moderate whereas it is considered high in Russia. Heritage points out that the regulatory framework in Sweden is rather complex but transparent and characterized by "a fairly extensive, though non-discriminatory, system of permits and authorizations need to engage in many activities" and that the main obstacles in Sweden are connected to rigorous labor and environmental regulations.[2] Both Vinnova and Heritage refer to the dominating position of a small number of very large enterprises. The former concludes that "the Swedish regulation structures have probably generated relatively weak incentives for start-ups and SME growth, although considerably improvements have been achieved in recent years," whereas large firms are better off given their administrative resources.[3]

A comprehensive survey of the deregulation reform by the Centre for Economic and Financial Research (CEFIR) in Moscow shows that the overall administrative burden (company registration, licensing, certificates, and inspections) on small enterprises was reduced after the reform package was introduced in 2002. But the reform progress has slowed considerably lately and the burden remains high and far from the benchmark set out in the new laws. The assessment of the overall business environment has improved throughout the surveyed period though. [4]

Taxes

Taxes are regarded as another major obstacle in doing business in most countries. With a 28 percent tax rate, Sweden is considered to have a relatively high level of corporate taxation whereas Russia's corporate tax rate (24%) is considered more moderate by Heritage.[5] But it is the income tax differences that are most substantial. The 60 percent top income tax in Sweden is very high whereas Russia has implemented and low flat rate income tax of 13 percent. Taking all taxes into account, Forbes Global ranked Sweden third on its misery index on the relative tax burden.[6] The total tax burden in Russia is about 40 percent lower according to the index. But whether or not a particular country's taxes can be considered business and entrepreneurial friendly is not only linked to their levels but also to the system and the effectiveness with which they are administered and collected. Sweden has relatively high corporate taxes but has had a well-functioning tax administration for a long time, which, together with a tax deduction policy specifically aimed at larger firms, does not make the overall tax burden for larger firms unfavorable. The conditions for shareholders, individuals, entrepreneurs and SME:s in general and for fast-growing firms in particular are however less favorable in international comparisons.[7]

The Russian tax administration has been characterized by its inefficiency and the tax morale has been rather poor until recently. Russia has, however, introduced a tax reform aimed at both lowering and simplifying taxes. In 2002, the flat income tax was introduced and a simplified tax system for small enterprises was introduced in 2003. This year, the value added taxes has been lowered (from 20 to 18 %) and reformed. The results are already showing in better tax morale, larger tax revenues and, most importantly for the purpose of this study, significant improvement for small enterprises. A recent survey by CEFIR shows that the reform really is appreciated by small firms and that almost half of the surveyed firms already use the simplified tax system. Those firms have seen the number of taxes drop by almost 50 percent (from 9.56 to 5.72) and they regard taxes as less of a problem than do other firms.[8]

Innovations & Clusters

We argued above that it is not possible to administer growth but governments do have a role in creating an environment conducive to growth and innovation. Such a policy, or innovation system, has been defined as "*the network of organisations, individuals and institutions which determine and shape the generation, diffusion and use of technology and other knowledge, which, in turn, explain the pattern, pace and rate of innovation and the economic success of innovation."*[9] These networks are popularly referred to as clusters.

In contrast to popular wisdom and some of the most well-known static indicators, Sweden is not a knowledge economy success story across the board even though it has been quite successful in certain areas. The above mentioned analysis of the Swedish innovation system concluded that *"in terms of relatively radical renewal, through start-ups and high growth in such firms, the Swedish national innovation system has been considerably less competitive than in terms of large industrial groups with advanced technology."* [10] This also illustrates how complex this issue is and how difficult it is to develop an all-encompassing innovation system. An important feature of a competitive cluster or innovation system is the interaction between the research, business, and public sector. This interaction is often called the triple helix and it has proved difficult to get all three sectors to interact effectively at the same time. In Sweden, the interaction between the large private enterprises and the public sectors has been quite successful as have the relation between the public sector and the research institutes at the (public) universities. The weakest links have been between the university research and the private sector on the one hand and between small firms and the other sectors on the other. It is becoming increasingly apparent that more focus needs to be put on innovation and research development in small firms, not only in Sweden but throughout the region. A recent study on SME:s and innovation in the countries around the Baltic Sea concluded that "while SME:s are widely regarded to be the backbone of the economy in these countries – and the motor for growth and employment – they are not the drivers of innovation."[11]

Russia still lacks a clear innovation system policy. The need to diversify the economy and find alternative sources of growth are however strong and the small firms still make up a relatively small share of Russian GDP.

Research & Development

Sweden is characterized by a high degree of technology penetration and strong research record, which is exemplified by the indicators from the Human Development Report below. The most obvious explanation to this development is the fact that Sweden spends more on research and development than most other countries. In 2001, only Israel spent more on R&D in relation to GDP.

Table 2

Knowledge Economy Indicators

	Phone penetration†		Mobile Penetration†		Internet Penetration†		Patents granted‡	Royalities & license fees±	R&D expenditure#
	1990	2001	1990	2001	1990	2001	1999	2001	1996—2000
Russia	140	243	0	53	na	29	105	0,4	1
Sweden	681	739	54	790	5,8	516	285	160	3,8

Source: Human Development Report
† per thousand people; ‡ per mln people; ± USD per person; # % of GDP

R&D expenditure as a percentage of GDP does not explain the whole story though and may give a somewhat too optimistic picture of the current state of the Sweden's research expenditure. The bulk of the research funds in Sweden comes from (77 %) and goes to (61%) the business sector. The public sector is the second largest financier (18 %) and the public research sector the second largest recipient (15 %).[12] The most striking features of the Swedish R&D financing are the great share of private financing and the low levels of interaction between private and public financing and performing sectors. This asymmetry reinforces the weak links between the different sectors discussed above and explains some of the underlying features of the Swedish technology performance. First, the public financing to the public research institutes tend to focus almost entirely on so-called curiosity-driven research, which is most often directed towards the academic world. Second, the heavy reliance on business sector financing for business research and the dominance of a few industrial groups make the strategic business or mission-oriented research in Sweden quite vulnerable. The financing for this kind of research actually declined during the last three decades.[13]

The Human Dimension

During a recent conference in Moscow, the President of the World Bank said that "human resources are the country's secret capital, its greatest wealth».[14] That is true not only for Russia, but for any country and especially in relation to developing a knowledge-based economy. We will take a brief look at two important factors regarding human resources in a knowledge based economy, the level of education and labor mobility.

Education & Skills

Education and skills is arguably the most important factor in developing a knowledge-based economy and the education system and level of skills is perhaps the most successful part of the Swedish innovation system. But is has not always been like that and there are a few challenges. Sweden scores very well in most indicators on education and skills, which is the result of an ambitious strategy in the last decade to promote higher education and research.[15] The present challenge lies in getting more students into natural sciences and engineering. Today, only 22 percent of the tertiary graduates are in those areas, which are considered especially important for the business sector.[16] A second challenge lies in expanding the use of highly educated people to sectors with relatively low levels of education, such as independent small firms, the primary sector, and certain service sectors.[17]

Labor Mobility & Brain Circulation

It is a well-known fact that labor mobility is low throughout Europe, especially when compared to the United States. Unfortunately, Sweden is no exception but rather an illustrative example. The average Swedish worker spends more than ten years on a job and there are no signs of improvement, rather the opposite for older workers. [18] Geographical as well as sectoral mobility is very low and one reason for the low levels of mobility is believed to be the strict labor laws pointed out by Heritage above. There seems to be a deeply rooted hesitancy to labor mobility throughout Europe and a fear of mobility from other countries, which was manifested in the opposition to extending the principle of free movement of labor to the new EU members.[19]

A noticeable trend is that the young and well-educated people are more likely to move than their older and less educated colleagues. Although this is to regard as a positive development it creates challenges for national policymakers and businesses. They need, on the one hand, to create an environment attractive enough for a significant share of the domestic graduates to stay and, on the other hand, work hard to ensure that the ones that chose to work abroad for while eventually are attracted back home together with foreign colleagues. Sweden and Russia face the same challenge in this regard.

The countries around the Baltic Sea would all benefit from promoting a strong regional environment in which brain circulation becomes a characteristic feature. Bilateral exchanges between universities, science parks, and public administrations are possible mechanisms but the most important factor is to ensure that human resources can move freely within the region.

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[1] Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive international benchmarking analysis", Vinnova Analysis VA 2004:1, p. 8.

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[3] Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive international benchmarking analysis", Vinnova Analysis VA 2004:1, p. 56; Heritage (2004)

[4] Cefir (2004): "Monitoring of Administrative Barriers to SME Development in Russia," Cefir, Moscow, 2004.

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[6] Forbes Global (2004): various statistics on www.forbes.org

[7] Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive international benchmarking analysis", Vinnova Analysis VA 2004:1, pp 55-58 for details and international comparisons.

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[9] Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive
international benchmarking analysis", Vinnova Analysis VA 2004:1, p. 3.

[10] Ibid. p. 7.

[11] Hanson, E. and Schwaag Serger, S. (2004): "Competing in the Single Market – SMEs and Innovation in the Baltic Countries and Poland", IKED , Malmö, 2004, p. 91.

[12] Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive international benchmarking analysis", Vinnova Analysis VA 2004:1.

13 Ibid.

14 RIA Novosti, June 3.

15 See for instance, the Human Development Report; Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive international benchmarking analysis", Vinnova Analysis VA 2004:1, pp. 47-48.

[16] Vinnova (2004): "The Swedish National Innovation System 1970-2003: a quantitive international benchmarking analysis", Vinnova Analysis VA 2004:1, pp. 45-46.

[17] Ibid. pp. 47-48 for detailed statistics.

[18] Ibid. p. 46.

[19] The proposal to introduce temporary restrictions on labor mobility from the new EU members was, however, voted down in the Swedish Parliament.

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Chapter 3
Economic Growth, Incomes and Social Differentiation

Creation of a knowledge-based society and rapid development of innovative technologies, including social technologies, is the key challenge today for Russia as much as for other countries. But Russia's progress in this direction is constrained by its current transition stage, and particularly by disparities of income and of a social nature, which have arisen in the course of economic reforms: in any society the level and dynamics of household incomes are the main socio-economic parameter, from which other parameters are derived.

The collapse of GDP in the 1990s led to dramatic changes in the level and dynamics of real household incomes. Together with other institutional and economic reforms, these changes resulted in a rapid and drastic social stratification of society. The problem of poverty assumed top priority for both socio-economic policy and scientific research, and is bound to stay top priority for years to come. Despite lengthy debates, estimates of the incidence of poverty in Russia still range from 7% to 70%. Without going into the reasons for such widely varying estimates, and while admitting the importance of the methodology used to measure poverty, we would emphasize that more or less precise estimate of its magnitude is only part of the problem. The causes and origins of poverty represent an equally or more important question, particularly when it comes to designing political measures to combat poverty. Identifying these causes and origins requires a different approach, premised on the following propositions:

1. The potential for analyzing poverty purely as *a shortage of income or material resources* at people's disposal (the traditional approach to defining poverty) is limited *a priori*. In reality, the socio-economic status of the population (individual, family, household) is described by a whole chain of factors, among which income and material (tangible) assets occupy an important but not the only place. For example, people's income, consumption and general social status depend on their education level and competitiveness in the labor market. Since wage labor accounts for 99% of the total working population in Russia,[1] competitiveness on the labor market remains the main factor of people's economic well-being.

2. Despite the existence of a significant «poverty zone», other social groups in Russia have demonstrated relatively successful survival techniques and development strategies in the complicated socio-economic conditions of the transition period. Who are these people? What kind of resources do they have at their disposal and how do they use them? What enables them to maintain and consolidate their socio-economic positions? What kind of socio-economic strategies do they pursue? Which of these strategies are survival mechanisms and which are development mechanisms? How do these people differ from other social groups? And *vice versa:* how do other groups, including the poor and those on low-incomes, differ from successful groups? Finally, to what extent can education and knowledge be regarded as guarantees and mechanisms of social development both for a particular social group (stratum, class) and for individuals?

... in any society the level and dynamics of household incomes are the main socioeconomic parameter, from which other parameters are derived

In reality, the socioeconomic status of the population (individual, family, household) is described by a whole chain of factors, among which income and material (tangible) assets occupy an important but not the only place

An Outline of the Russian Social Pyramid

In order to answer these questions, we need to examine the social pyramid in contemporary Russia, analyzing the incomes of various groups and potential of these groups as regards transition to a knowledge-based society.

The survey, which we use as the basis for our assessment of stratification in Russia society, is from 2000,[2] by when Russia had finally taken the step from economic recession to economic growth (that happened in 1999—2000) and the country's new social structure had mainly taken shape (Figure 3.1).

The lower strata constitute just over 10% of all Russian households. In terms of material status (level of material well-being), these families are below the pover-

ty line. Adults in such families have no tertiary education and are therefore insufficiently competitive in the labor market and tend to hold low-paying and low-prestige jobs. They have no illusions about their social status, and count themselves as belonging to the lower strata of society.

The middle classes make up about 20% of all Russian households (a more detailed analysis of this indicator is given below). Whether this is a lot or a little depends on one's point of view. In any case, this figure refutes the thesis that «there are no middle classes in Russia», as much as it refutes the antithesis that «an overwhelming majority of Russians belong to the middle class». Although the middle class accounts for a bigger share of the population in developed market economies (60—70%), the 20% figure seems to us large enough to assure that the middle class in contemporary Russia cannot be ignored.

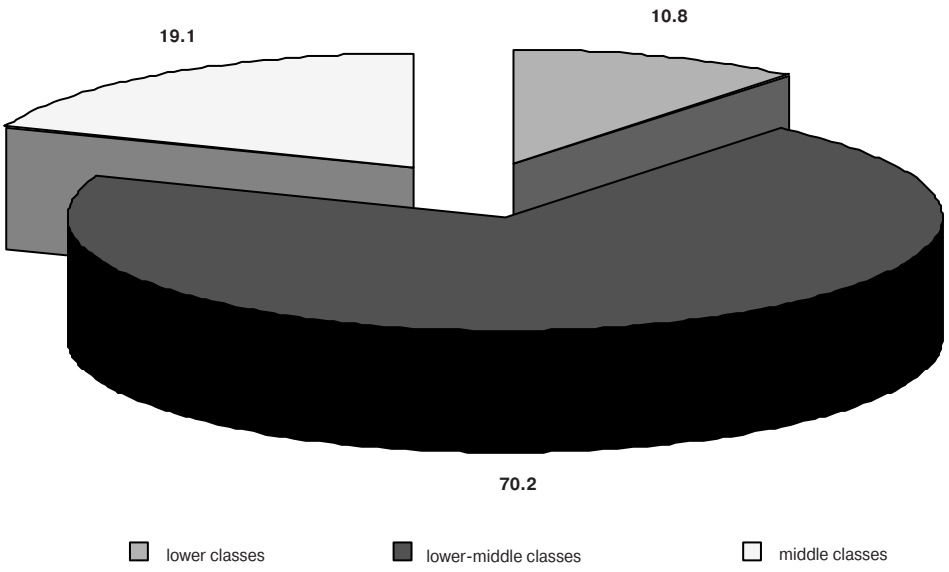
The diagnosis regarding the remainder of society is less clear, but there is no doubting the existence of a large intermediate group between the middle classes and the lower strata, a group which is best described by the formula «no longer lower but not yet middle».[3] These people constitute an overwhelming majority: they are 70% of all Russian households. This part of the population has a certain measure of social and economic resources, which give it the potential for moving up into the middle class.

Strictly speaking, what is missing in this structure is the upper class, whose existence and major influence on society and its socio-economic structure is in no doubt (a list of 100 wealthiest members of the upper class in Russia published by the US magazine *Forbes* touched off a lively debate in society and in the mass media). But a scientifically grounded estimate of the percentage share of the elite in the social structure appears to be impossible: it is known that wealthy households are virtually unrepresented in surveys conducted by Goskomstat (the State Statistics Committee) and are never captured by random area sampling in public opinion polls. At any rate, their share is so small that the upper class cannot be ranked among the mass social groups.

Household Income Dynamics in Conditions of Economic Growth: Political Alternatives

Does economic growth guarantee increase of household income? An affirmative answer to that question is usually taken for granted, and developments in the past few years seem to provide an additional argument in its favor. The economic and social indicators for 2000—2003 look as if they should inspire optimism (Table 3.1).

Figure 3.1. **Broad Social Strata in Contemporary Russia**



Growth of household incomes has outpaced relatively high rates of economic growth, with households in 2003 receiving 114.5% of what they received in 2002, according to preliminary figures. Two factors have worked together in the past four years: on the one hand, positive economic trends have entailed recovery in a number of economic sectors with resulting rise in wages and incomes in these sectors; on the other hand, increase in state budget revenues, expansion of the tax base and better tax compliance have enabled the government to carry out a number of social measures, including indexation of minimum pensions and minimum wages in the public sector.

However, the positive trend in income indicators for 2000—2003 is open to different interpretations.

In the first place, estimates show (Table 3.1, Figure 3.2) that in 2002 real household income merely regained its pre-crisis (1998) level. In this sense, an actual increase in household income was only recorded in 2003.

In the second place, international experience shows that economic growth is often accompanied by growing income inequality. What are the patterns of change in Russian household incomes in the context of the three strata identified above: lower, middle and lower-middle?

The material living standards of the first group (lower and poor) depend in large part on government efforts and social programs. Most of these people belong to traditionally poor categories (pensioners, unemployed persons, families with many children, disabled persons, etc.), whose material status is largely determined by the capabilities of government finance and the social security system. At the same time, there is a relatively new category of poor people, the so-called «working poor», who are mostly employed in the public sector of the economy, and also in depressed industries with an absolutely low level of wages (inadequate to meet the basic needs of a family, although possibly above the subsistence level). Income growth in this social group depends on direct government regulation through indexing of minimum pensions, wages and benefits.

The middle classes are mostly employed in relatively efficient economic sectors, pri-

Figure 3.2. **Average Per Capita Household Money Income, Wages and Pensions Compared to 1997 (1997 = 100%)**

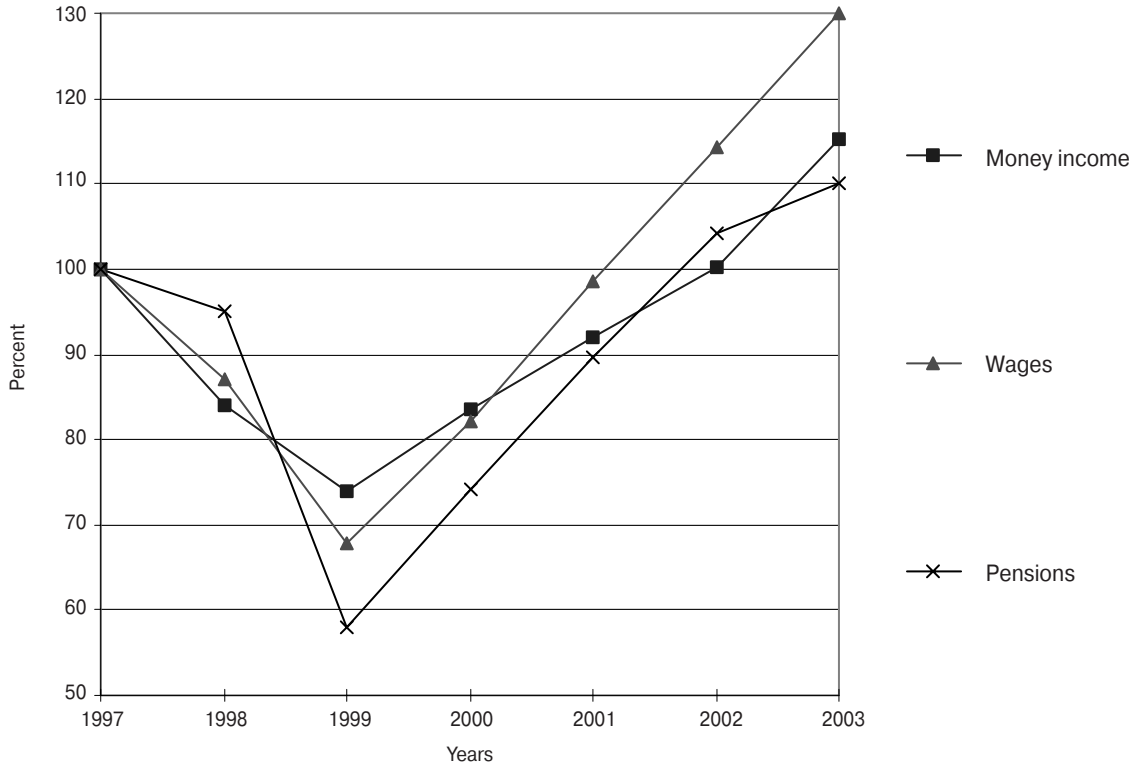


Table 3.1

Key Indicators of Household Income Levels and Changes in 1992—2003

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Average household money income per capita at current prices, roubles/month	4.0	45.2	206.3	515.5	770.0	942.1	1,012	1,659	2,281	3,060	3,888	5,129
Average household money income per capita at 2001 prices, roubles/month	2,825.2	3,277.2	3,703.2	3,110.7	3,141.8	3,330.3	2,797.5	2,461.8	2,781.8	3,060.0	3,335.4	3,819.0
Change in real household money income, % of previous year	52	116	113	84	101	106	84	88	113	110	109	114.5
Money income level compared to 1997 (1997 = 100%)	**84.8**	**98.4**	**111.2**	**93.4**	**94.3**	**100.0**	**84.0**	**73.9**	**83.5**	**91.9**	**100.2**	**114.7**
Average monthly nominal gross wage at current prices, roubles	6.0	58.7	220.4	472.4	790.2	950.2	1,051.5	1,522.6	2,223.4	3,240.4	4,413.6	5,512
Average monthly nominal gross wage at 2001 prices, roubles	4,442.9	4,460.7	4,103.8	2,954.8	3,132.1	3,288.7	2,861.1	2,231.7	2,700.3	3,240.4	3,758.9	4,149.8
Change in average gross wage, % of previous year	67	100.4	92	72	106	105	87	78	121	120	116	110.4
Wage level compared to 1997 (1997 = 100%)	**135.1**	**135.6**	**124.8**	**89.8**	**95.2**	**100.0**	**87.0**	**67.9**	**82.1**	**98.5**	**114.3**	**126.2**
Average monthly pension at current prices, roubles	1.6	19.9	78.5	188.1	302.2	328.1	399.0	449.0	694.3	1,024.1	1,379	1,749
Average monthly pension at 2001 prices, roubles	1,070.6	1,402.4	1,360.4	1,101.9	1,201.1	1,141.0	1,084.0	661.2	846.4	1,024.1	1,188.0	1,255.7
Change in average monthly pension, % of previous year	52	131	97	81	109	95	95	61	128	121	116	105.7
Pension level compared to 1997 (1997 = 100%)	**93.8**	**122.9**	**119.2**	**96.6**	**105.3**	**100.0**	**95.0**	**58.0**	**74.2**	**89.8**	**104.1**	**110.0**
Minimum monthly wage (as of January 1)	0.2	0.9	14.6	20.5	63.3	83.5	83.5	83.5	83.5	200.0	300.0	450.0
Minimum monthly old-age pension with compensation	1.1	26.3	40.7	89.6	190.4	222.0	234.2	290.3	427.8	474.1	no data	no data
Consumer price index, December to December (December of previous year = 100 %; prior to 1996, times)	26.1	9.4	3.2	2.3	121.8	111.0	184.4	136.5	120.2	118.6	115.1	112.0
GDP at comparable prices, % of previous year	85.5	91.3	87.3	95.9	96.6	100.9	95.1	105.4	109.0	105.0	104.3	106.7

Notes:

Incomes/wages/pensions are given with due regard for the 1998 redenomination of the rouble.

In 2003, the average pension is given for October 2003, and its change, for October 2003 over October 2002 (Oct 2002 = 100%).

The subsistence level in 2003 is given for the 3rd quarter.

The minimum wage in 1992 is given for December 1991, and in 1993, for December 1992; on October 1, 2003, the minimum wage was raised to 600 roubles per month.

The minimum monthly pension in 1992—2001 is given as the weighted average for the year.

GDP growth rate in 2003: January-September 2003 over January-September 2002 (Jan-Sep 2002 = 100%).

Table 3.2

Income Inequality Indicators in 1992—2003

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Gini coefficient	0.289	0.398	0.409	0.381	0.387	0.401	0.399	0.4	0.399	0.396	0.398	0.402
Decile ratio (ratio of income of the wealthiest 10% of the population to income of the poorest 10%)	8	11.2	15.1	13.5	13	13.5	13.8	14	13.8	13.8	14	14.4
Poverty rate	33.5	31.5	22.4	24.7	22	20.7	23.3	28.4	29.1	27.6	25	21.9
Income distribution by quintile												
1st (lowest income)	6	5.8	5.3	5.5	6.2	5.9	6	6.1	6	5.9	5.6	5.6
2nd	11.6	11.1	10.2	10.2	10.7	10.2	10.4	10.4	10.4	10.4	10.4	10.3
3rd	17.6	16.7	15.2	15	15.1	14.8	14.8	14.7	14.8	15	15.4	15.3
4th	26.5	24.8	23	22.4	21.6	21.6	21.2	20.9	21.2	21.7	22.8	22.7
5th (highest income)	38.3	41.6	46.3	46.9	46.4	47.5	47.6	47.9	47.6	47	45.8	46.1

Notes:
The poverty rate (incidence of poverty) in 2003 is given for the 3rd quarter.
The Gini coefficient, decile ratio and income distribution by quintiles (20% groups) are given for January-September 2003.

marily the so-called secondary sector of the economy: organizations and companies engaged in foreign transactions, in general commercial activities ensuring the operation of the market, and in banking, finance, credit and insurance. In the real sector, wages are highest in the fuel and energy complex (especially in the oil and gas industries), ferrous metallurgy, construction and transport. These sectors have been the first to feel the effect of economic growth and have responded, in particular, by raising the wages of their employees.

In other words, the economic recovery is not a general but a local phenomenon and is focused in certain sectors, industries and regions, so that direct benefits of economic growth have only been felt in certain parts of the labor market. Income inequality indicators (Table 3.2) show this very well. In 2003 — the first year of actual household income growth — there was a significant reduction in the share of households with income below the subsistence level (from 25% in 2002 to 21.9% in 2003), but that was also the year when income inequality indicators approached the levels of 1997—1999, when things were not going well in the economy and when these indicators were at a maximum: the Gini coefficient in 2003 stood at 0.402 and virtually coincided with the 1997 figure of 0.401, and the decile ratio was 14.4 times, even exceeding the 1999 peak of 14 times.[4]

The most problematic social stratum, the 70% «lower-middle» group, finds itself beyond the range of both income-enhancing mechanisms: economic (wage growth) and social (state subsidies). The impulses generated by the positive economic trends, on the one hand, and by the state's income adjustment policy, on the other, either do not reach this group at all or reach it in a weak and diluted form.

Consequently, each political paradigm «operates» only for a specific group: state adjustment of incomes has an effect on the poverty zone, while economic growth helps to improve the material well-being of the highest-income groups. The «intermediate» group misses the benefits of both mechanisms.

So, Russia's record over the past three years confirms that household income inequality tends to grow during an economic upturn. But its specific feature is that the biggest loser is not the poorest stratum (lower classes), but the group that occupies an intermediate position on the social scale (the lower-middle classes).

This state of affairs threatens a perpetuation of the existing social pyramid, as follows:

1. The middle classes, as the most successful social group, will be able to consolidate their socio-economic positions and augment their income, but will not increase in size.

2. The poverty zone will tend to shrink, but only marginally, and will remain significant.

3. The «lower-middle» bracket will remain the basic social group without any

clear prospects of upward mobility and with distinct risks of moving down into the poverty zone in the event of adverse changes in the overall economic situation.

In the context of this report, it is crucial to note that the main criterion used by the 2000 survey for assessing socio-professional status — whether a person belongs to one of the three main groups — was tertiary (higher) education. But the measure had to be the very fact of a person's having tertiary education, without regard to its quality, since there is no clear-cut methodology for assessing the latter. In connection with this, it is clearly very important to assess how access to education is connected with socio-economic inequality and income levels (see Box 3.1).

The Middle Classes in Contemporary Russia

Economic definition of the middle class is based on estimates of material assets (income, consumer spending and behavior) and, in effect, identifies the middle class with middle-income groups of the population.

The middle classes are a major force for progress towards a knowledge-based society, so successful formation of such a class and development of its human potential are among key prerequisites for Russia's transition to such a society.

The problem of the middle class in today's Russia is the focus of heated debate. And this is not surprising. The emergence of a middle class could be regarded as important evidence and even a criterion of effective reform, testifying to the sustainability of the entire system of economic, social and political institutions, whereas the absence of a middle class could be seen as a sign of the failure of socio-economic transformation in Russia.[5]

Economic definition of the middle class is based on estimates of material assets (income, consumer spending and behavior) and, in effect, identifies the middle class with middle-income groups of the population.

However, sociology uses two other approaches to defining the middle class. The basis of the first approach is an analysis of people's socio-professional status. According to this approach, the middle class is said to consist of well-educated and economically active members of society whose jobs nevertheless fall short of top-level authority.[6] So, the middle class is characterized by the following socio-professional parameters: (1) tertiary education; (2) regular employment; (3) non-manual labor and (4) a managerial position. Evidently, a tertiary education is the key element of this approach.

The second approach, which is used by modern sociology to identify social strata, centers on so-called self-identification: a person's subjective self-assessment of his/her social status. This approach is at the heart of the theory of social stratification and makes it possible to identify a «subjective» middle class.[7]

Each of these definitions uses valid and essential criteria, but each of them is, to some extent, one-sided and limited. For example, respondents placing themselves in the middle segment of the identification scale when the self-identification concept is applied cannot be regarded unequivocally as belonging to the middle class: to a significant extent their response is only a reflection of their notions about contemporary society and their position in this society relative to other social groups.

Overall, the essence of middle class identification in society during transition can be summarized as follows:

(1) The middle classes cannot be described by a single integral attribute (defining feature). They are a social universe characterized by a chain of attributes, including:

- *material resource attributes:* level of income (expenditure, consumption), savings and property status;
- *immaterial (intangible) resource attributes:* education level, professional qualifications and occupation;
- *social well-being (self-identification) attributes:* successful economic behavior strategies, self-assessment of success in adapting to the new economic conditions, self-assessment of current comfort levels, etc.

(2) The social groups that constitute the middle class have varying levels of attribute concentration. This suggests that the middle classes can be stratified by the level of concentration of dominant attributes.

A representative survey of 5,000 households from 12 regions of Russia[8] has shown that 21.9% of all households belong to the middle class in terms of socio-professional status, 21.2% in terms

Box 3.1

Access to Tertiary Education and its Quality

The Russian tertiary education system has divided into two subsystems: elite education providing high-quality services, on the one hand, and mass education providing services of a fairly low quality, on the other. Low-quality tertiary education can, with some reservations, be called relatively accessible. But opportunities for obtaining high-quality professional training seem to have shrunk for most people. Different individuals and different social groups have unequal access to tertiary education.

Determinants of access to tertiary education can be listed as follows:

- ability;
- quality of general secondary education;
- amount and quality of additional educational services (additional subjects at school, preparatory courses for entering higher education institutions (HEIs), coaching services, etc.;
- access to information on opportunities in various specialties at different HEIs;
- physical ability (for example, disabilities that do not affect learning capacity, but restrict participation in the educational process);
- family composition; education level and social capital of family members;
- family well-being (income level, etc.);
- place of residence;
- other factors.

Socio-economic inequality limits access to tertiary education for broad strata of the population, particularly access to institutions providing high-quality educational services. The most significant constraints arise from disparities in:

(1) household income level: members of low-income families have the least opportunities for entering HEIs;

(2) place of residence: people living in rural areas and in small towns are at a disadvantage, as are inhabitants of depressed areas; regional disparities in terms of the availability of HEIs also have an effect on access to higher education;

(3) level of general secondary education received: there are growing disparities between schools in terms of education quality, as declining standards in some schools contrast with a limited number of «elite» schools, where standards have been rising.

Family income levels influence access to higher education both directly, via ability to pay fees, and indirectly. The indirect influence includes such factors as: whether a family can afford to pay for travel to the place of education (if it is located in another region), the student's daily living costs, including accommodation, food, etc. There is also bound to be a link between the family's material living standards and its social and human capital, which are inherited characteristics and are among the factors differentiating access to higher education.

The following people could be tentatively counted as socially disadvantaged as regards opportunities for obtaining higher education:

- school-leavers from rural schools;
- school-leavers from «weak» schools in various urban localities;
- people living in outlying settlements and regions;
- inhabitants of regions with poorly developed educational infrastructure;
- inhabitants of depressed areas;
- members of poor families;
- members of single-parent families;
- members of socially deprived families;
- homeless and neglected children;
- those brought up in children's homes;
- the disabled;
- migrants;
- members of ethnic and religious minorities.

There was already a tendency in Soviet times towards degradation of higher education as a means of acquiring professional abilities that lead to success in life. Some recent trends in development of the Russian higher education system (such as rapid spread of distance/correspondence education and proliferation of HEI branches and fee-paying departments offering educational services at low prices) as well as growing demand for a second higher education, recorded in sociological studies, suggest that provision of low-quality higher education services is on the increase.

Development of a low-quality education system cannot be expected to reduce barriers to social mobility or to alleviate social inequalities in society. The sort of higher education, which is intended to provide status without providing genuine learning, will be devalued as it acquires a «mass character», because it will become evident that the status of a «diploma holder» does not entail appropriate socio-professional knowledge or skills. So, expectations of students of such HEIs will be disappointed, leading to increase of social discontent and dissatisfaction with the higher education system.

Source: Problemy dostupnosti vysshego obrazovaniya (Problems of Access to Higher Education), Independent Institute for Social Policy (IISP), 2003.

of material status, and 39.5% in terms of self-identification.

About 7% of Russian households lie at the intersection of these three attributes, i.e., these families have all the basic characteristics of the middle class. They are the indisputable and stable middle class, what we can refer to as the «core middle class». At the same time, there is a large group of households, which possess only two key attributes of the middle class but which are very close to the core in terms of most characteristics (the so-called «semi-core middle class») (Table 3.3 and Figure 3.3).

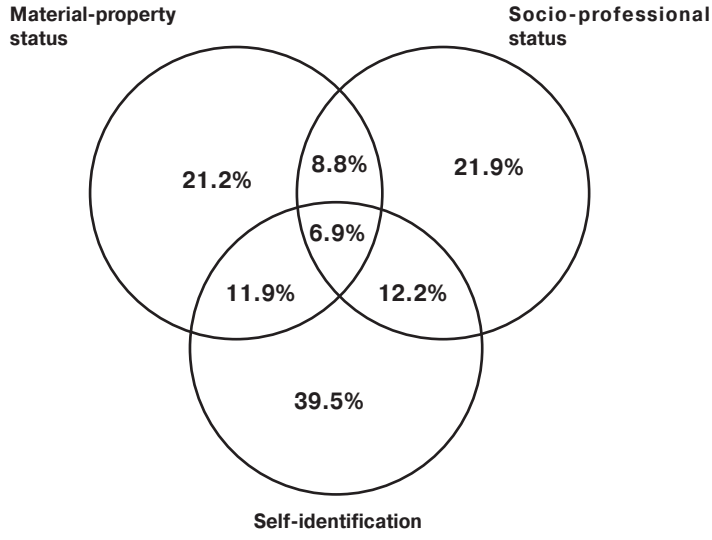
This group cannot be ignored, especially in assessing the prospects for expansion of the middle class and the conditions, which are needed for new social strata to join its ranks. About 12% of Russian families possess two (any two) attributes of the middle class. As a result, the generalized («core» plus «semi-core») middle class in contemporary Russia can be estimated at 19% of the total number of families.

Table 3.3

Structure of the «Semi-Core» Middle Class

Combination of criteria	Percentage of households
Material-property status plus Socio-professional status	8.8
Material-property status plus Self-identification	11.9
Socio-professional status plus Self-identification	12.2

Figure 3.3. **Empirical Structure of the Middle Classes**



On the other hand, the fact that just over 50% of all Russian households possess various basic characteristics of the middle class is not very encouraging either. In particular, it tends to undermine some widely held beliefs about what has happened to the Russian middle class during the reform period. The generally accepted or, at any rate, the dominant view is that sharp reduction in the size of the middle class (which was sizeable and well-established in Soviet Russia despite its pretended non-existence) was caused by dramatic decline in household income and quality of life resulting from the economic reforms of the early 1990s. We agree that this was an important factor, but it was by no means the only factor. It is equally important to note that socio-professional parameters of the middle class are not as widespread as might be suggested by the frequently heard statement that Russia is a country with a highly educated population. Other studies have found that the supposed high proportion of Russians with higher education and the quality of that education are both open to question (doubts about quality arise, in particular, from the fact that such education often fails to lead to a well-paid and prestigious job). It has been revealed that a sizeable group of households with a fairly satisfactory level of material well-being and high self-identification characteristics cannot be included in the generalized middle class, because their professional status is not high enough. This segment is much larger than the «losses» caused by inadequacy of other attributes: material well-being and self-identification.

The only point, which seems to emerge as certain, is one that has already been noted by Russian sociologists: the «subjective» middle class, as measured by self-identification, is much larger than the «objective» middle class, as measured by material living standards and socio-professional characteristics.

The next question concerns the potential for expansion of the middle class. The «lower-middle» bracket consists of two segments that differ in their preparedness for moving up into the middle stratum. Current research shows that 33% of households in the «lower-middle» group (which includes 70% of all Russian households) have a greater chance of joining the ranks of the middle class, and 37% have a lesser chance. That entails 50% as the upper estimate for potential size of the middle class in the foreseeable future, assuming successful socio-economic development in Russia.

The empirical findings presented in Figure 3.3 suggest a large number of non-trivial generalizations:

- Only a little more than a third of all households, which are middle-class from the socio-professional standpoint, are middle class in material terms (8.8% out of 21.9%). Put bluntly, this means that only a third of all educated people have learned to earn money.
- On the other hand, no more than a third of all well-to-do Russian households (8.8% out of 21.2%) have fairly high professional positions. Bluntly, one could say that only a third of those who know how to earn money are well-educated.
- Only just over half of all middle-income families (11.9% out of 21.2%) identify themselves as middle-class. So, material welfare is

certainly no guarantee of high social self-assessment.

- Less than a third of all families subjectively ranking themselves among the middle classes (11.9% out of 39.5%) are objectively justified in doing so by their material status. So the subjective middle class is much larger than middle-income groups of the population.
- Only just over half of all households, whose socio-professional features define them as middle classes (12.2% out of 21.9%), confidently define themselves as such. So education and profession (occupation) are not always sufficient reason for a high self-assessment.
- Less than a third of the «subjective» middle classes (12.2% out of 39.5%) have a socio-professional justification for their self-assessment. In other words, the subjective middle class is much larger than the socio-professional middle class.

All of this points to a high degree of inconsistency in the criteria used to identify the Russian middle classes, which, for its part, reflects extreme immaturity of the socio-economic structure both of the middle classes themselves and of Russian society as a whole. A society, where only a third of all educated people have learned to make money and only a third of those who can make money are well-educated, falls far short of the ideals of a stable and economically efficient knowledge-based society, where a tertiary education offers a near-guarantee of a relatively high-paid job, entailing high assessment by people of their own social status. The main conclusion from empirical measurements of the middle classes in Russia seems to be the strikingly inconsistent, «fuzzy» nature of main socio-economic characteristics of the middle class, which should ideally all work together to ensure emergence of a large and stable social grouping.

* * *

The analysis of income and social differentiation processes, offered in this chapter, suggests the following conclusions:

- The economic growth recorded over the past four years has been accompanied by steady rise in real household incomes, but has also increased income inequality, which is manifested in: (a) growth of middle-class incomes as a natural response of developing economic sectors to the favorable economic situation; and (b) only slight reduction of the poverty zone as a result of government social programs. Incomes of an absolute majority of the population, concentrated within the «lower-middle» group, have not benefited directly from economic growth.
- People's socio-economic status depends not only on income and consumption levels, but is also described by a chain of other parameters: material resource attributes, intangible resource attributes, and social well-being (self-identification) attributes.
- At the stage of transition in Russia, these factors have operated discordantly and inconsistently. In particular, a tertiary education is no guarantee of relatively high income, resulting in negative and unstable self-identification ratings.
- It would be premature to say that a knowledge-based society has taken shape and is successfully developing in Russia. A country, in which tertiary education is no guarantee of competitiveness in the labor market or of material well-being, falls far short of the ideals of a modern innovative society.
- Despite some confusion of perceptions in Russia, it is clear that high educational standards and ability to innovate are the key mechanisms of upward mobility in the modern world, enabling people to reach a higher position on the social scale. This means that success of social development in Russia depends on how successfully the country moves along the road to a knowledge economy.

[1] The number of employees equals the number of all persons working at enterprises and organizations minus the number of employers/owners, who constitute about 1% of the total working population, and this share is fairly stable. See: *Obzor zanyatosti v Rossii* (Survey of Employment in Russia), Issue No. 1 (1991-2000), Moscow, TEIS Publishers, 2000, p. 69.

[2] The survey that provided the basis for the stratification structure was carried out in November-December 2000.

[3] In the language of Western methodology, this group could be called the lower-middle classes.

[4] Strictly speaking, this division of the population into quintile (20%) groups (see Table 3.2) does not fully coincide with the social stratification methodology used above, because the latter is based not only on income levels, but also on a number of other factors characterizing both material assets and such intangibles as education level, position in the labor market and social status. However, at the empirical level the top 20% income group overlaps with the generalized middle class by 70%, while the lower classes fully belong to the bottom 20% income group. Consequently, despite the noted methodological distinctions, the general conclusions regarding uneven dynamics of household incomes retain their validity.

[5] For Russian sociology, the term «middle class» is not canonical. The categories used today by Russian researchers to identify the middle class are highly diverse: «middle class», «middle estate», «middle stratum/strata», etc. The term was first put to use by Max Weber, the founder of theories about the middle class, and in the period of socialist construction in Russia it was criticized and rejected for fairly obvious reasons. It was replaced with «middle strata», defined in the spirit of the class approach. During perestroika, the term «middle class» was no longer attacked, but was simply never mentioned. It is only over the past five years that the term «middle class» has become part of public consciousness and has been accepted in academic circles, although there is still no clear-cut definition or research methodology.

[6] M. Weber, «Osnovnye ponyatiya stratifikatsii» (Basic Concepts in Stratification), *Sotsiologicheskiye issledovaniya,* No. 5, 1994, pp. 147—156. On effectiveness of this approach see: V.V. Radayev, «Stratifikatsionnyi analiz postsovetskoi Rossii: neoveberianski podkhod» (Stratification Analysis in Post-Soviet Russia: Neo-Weberian Approach», I.A. Butenko (Editor in Chief), *Sposoby adaptatsii naseleniya k novoi sotsialno-ekonomicheskoi situatsii v Rossii* (Modes of Adaptation of the Population to the New Socio-Economic Situation in Russia), Issue XI, Moscow, Moscow Public Research Fund, 1999, pp. 46—59.

[7] L. Khakhulina, «Subyektivnyi sredni klass: dokhod, materialnaya obespechennost, tsennostnye oriyentatsii» (The Subjective Middle Class: Income, Material Well-Being and Value Orientation), *Ekonomicheskiye i sotsialnye peremeny,* Moscow, No. 2, 1999; Yu. Levada, «Sredni chelovek: fiktsiya ili realnost?» (The Average Man: Fact or Fiction?), *Ekonomicheskiye i sotsialnye peremeny,* Moscow, No. 2, 1997.

[8] Sredniye klassy v Rossii: ekonomicheskiye i sotsialnye strategii (The Middle Classes in Russia: Economic and Social Strategies). Authors: Ye.M. Avraamova, T.M. Maleva (ed.), M.V. Mikhailyuk, L.I. Nivorozhkina, A.A. Ovsyannikov, L.N. Ovcharova, V.V. Radayev, Ya.M. Roshchina, S.V. Surkov and N.Yu. Firsova, Carnegie Moscow Center, Moscow, Gendalf, 2002.

Chapter 4
Can Knowledge Replace People?

Russia is Shrinking

Russia's demography is an aspect of its human potential that gives increasing cause for concern. Although Russia still has more people than any other country in Europe, its population has been in steady decline since peaking at 148.3 million in 1992, and had shrunk by 4.8 million to 143.5 million as of mid-2002 according to current measurements. The October 2002 census recorded a higher figure of 145.2 million, but that would still suggest significant decline. The population is reckoned to have fallen by a further 1—2 million since the census to 144 million as of January 1, 2004. In 1950, Russia (in its present borders) ranked fourth in the world by population size, by 2002 it had fallen to seventh (after China, India, the USA, Indonesia, Brazil and Pakistan). Russia was passed by Bangladesh in 2003 and now ranks eighth.

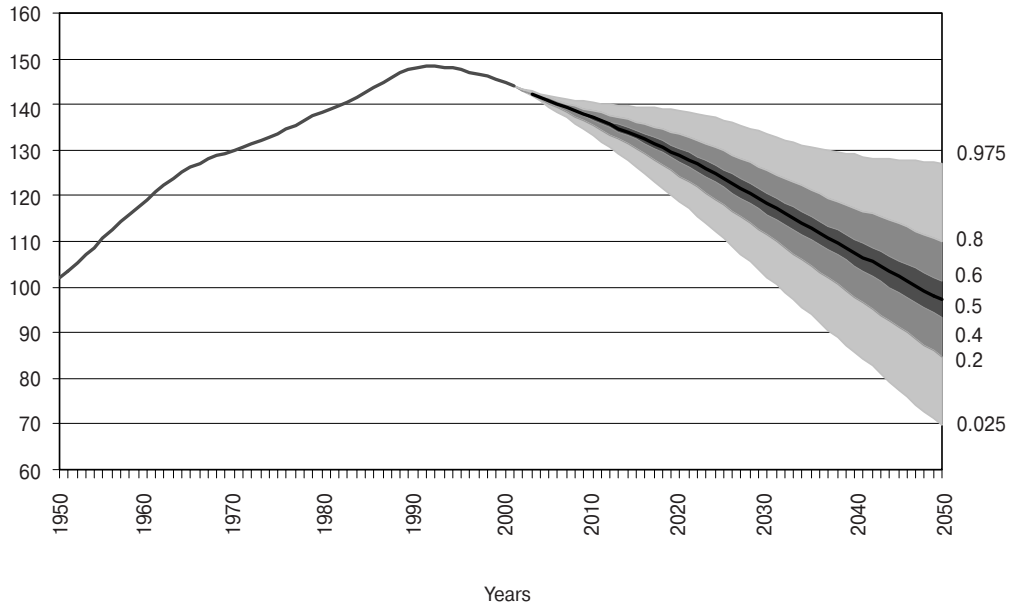
The population of the Asian part of Russia is shrinking particularly fast. Overall decline in Russia's population between the 1959 census and the 2002 census was 1.3 million, but decline in the European part of the country was only 0.2 million, while the Asian part of Russia, already sparsely inhabited, lost 6.5 million people (many of them migrating to European Russia).

Forecasts give few grounds for optimism. The base scenario of latest forecasts by the UN suggests a 30% decline between 2000 and 2050 to 101.5 million people. Predictions by Russian forecasters are approximately the same (Figure 4.1).

This unfavorable demographic trend naturally raises the question to what extent the quantitative decline can be compensated by qualitative improvement of the population.

Slower growth or even contraction of a country's population are compatible with

Figure 4.1. **Russia's Population in 1950—2000 and Population Projection until 2050 according to Different Confidence Probabilities (millions)**



Source: The Population of Russia in 2001. The Ninth Annual Demographic Report of the Center for Demography and Human Ecology, Moscow, 2002, p. 183.

rise of demographic potential if increase of life expectancy adds to the total number of years that people are living. Increase of life expectancy from 50 to 75 years for men and to 80 years for women (achieved in many industrial countries in the 20th country) increases the total life period of each generation by 50% for men and 60% for women. Reduction of mortality has not been as significant in Russia as in Western countries. Nevertheless, life expectancy increased from under 35 years at the start of the 20th century to 65 years for both sexes by the beginning of the 21st century, so that 145 million inhabitants of Russia today are equivalent to nearly 280 million at the beginning of the 20th century in terms of man-years actually lived.

Another factor is the incomparably higher level of education in Russia today compared with the start of the 20th century. Basic literacy — the ability to read and write — was still the main educational challenge in Russia as late at the 1920s. The share of men and women with secondary or higher education grew rapidly among generations born in the second half of the 1930s and later. A third of men born in the first half of the 1930s received secondary, or both secondary and higher education, and the figure for women was 294 per 1000. The respective indicators for those born 30 years later, in the first half of the 1960s, were 911 and 947 per 1000 (Table 4.1).

Levels of education in Russia have experienced a setback recently, as evidenced by data gathered in the most recent population census, from 2002. At first sight the 2002 data seem to show some improvement, since 902 out of every 1000 people aged 15 years and over have education above primary level, compared with a figure of 806 per 1000 according to the 1989 census. But this development is mainly due to fall in the share of the population born in the early 20th century, when education was still rudimentary. The educational level of people aged under 40 years showed a modest change for the worse (see Table 4.2).

The declining level of education among young Russians contrasts with continued improvement of education levels in most developed countries, in particular in all countries of the European Union (see Annex to chapter 4 (A-4)). The share of people, who only have basic secondary education, is lower in younger age groups in these countries.

But, despite the recent unfavorable tendencies, Russia still has a fairly highly educated population. Higher levels of education are always attended by higher labor productivity and much greater economic efficiency in general, but they are also accompanied by a much higher level of consumption, both in the process of production and by individuals. It is fair to say that an educated person today takes up much more space in the world than would have been the case a hundred years ago. Perhaps population decline is a natural response to this new situation and, therefore, should not cause anxiety.

Unfortunately, this argument does not work for modern Russia, where population decline threatens to have very serious neg-

Table 4.1

The Share of Russian Men and Women with Secondary or Secondary and Higher Education (%). Shown by Years of Birth from 1925 to 1969

Years of birth	Secondary education (general and specialized)		Secondary and higher (or incomplete higher) education	
	Men	Women	Men	Women
1925—1929	20.6	20.3	10.6	6.8
1930—1934	21.1	20.4	11.1	9.0
1935—1939	32.4	36.3	17.4	13.0
1940—1944	39.6	45.7	19.2	16.2
1945—1949	53.0	58.7	23.0	23.0
1950—1954	60.4	66.5	19.9	20.4
1955—1959	67.9	70.4	18.6	21.2
1960—1964	72.0	72.1	19.1	22.6
1965—1969	73.0	71.1	18.9	23.9

Source: Main Results of 1994 Microcensus of the Population, Moscow, Federal Service for State Statistics, 1994, p.71.

Table 4.2.

People with Education above Primary Level per 1000 in Various Age Groups, according to the 1989 and 2002 Population Censuses

	1989	2002
All those aged 15 and over	806	902
Age groups		
15—19	954	932
20—24	990	972
25—29	990	976
30—34	986	976
35—39	979	978
40—44	959	978
45—49	864	976
50—54	761	967
55—59	540	937
60—64	560	846
65—69	530	724
70 and over	231	534

ative consequences. It is already clear that the country's population is inadequate for the size of its territory, the length of its borders, the vast expanses which are in need of development, its undeveloped network of urban settlements, etc. Russia has always been a poorly developed country - rich in land but with a very low population density — but the problem has become much more acute after disintegration of the USSR, from which Russia inherited three quarters of the territory but only half of the population.

Population density in the European part of Russia is comparable with that in the USA (in European Russia there are 27 people per square kilometer and in the USA there are 29), but population density, even in this Russian heartland, is far below that of industrialized Western European countries. A quarter of the population is concentrated in the country's central economic area — a part of European Russia, occupying less than 3% of total Russian territory. But even here population density (62 people per square kilometer) is just half of that in the European Union (119 people per square kilometer). A mere 22% of the population live in the Asian part of Russia, which accounts for 75% of its territory, representing a density of 2.5 people per square kilometer: the demographic potential of Siberia and the Russian Far East is patently insufficient for development of the natural wealth, which is located there, and for creation of a developed, connected economic and settlement structure.

Inadequacy of Russia's demographic potential has an impact on development of its cities. The share of the urban population in Russia (73%) is close to that in Europe and differs little from such countries as the USA (75%) or Japan (77%). But Russia's urban population is spread across a large number of modest urban settlements, while the country's network of big cities remains underdeveloped. After disintegration of the USSR, Russia inherited 13 out of 24 Soviet cities with populations over one million. Russia had the same number of such cities in the 2002 census, and only two of them are located East of the Urals. The country has

Box 4.1

Population Dynamics and Development of Higher Education in Russia

The number of higher-education institutions (HEIs) in Russia doubled between 1990 and 2002, mainly due to creation of numerous non-state institutions.

Higher Education in Russia: 1970—2002

Year	Number of HEIs	Number of students, thousands	Number of students per 10,000 persons aged 15—29 years	Number of university entrants, thousands	Number of persons born 18 years earlier, thousands	Number of university entrants as ratio of number of persons born 18 years earlier
1970	457	2,671.7	910	536.6	2,928	0.18
1975	483	2,856.9	810	587.1	2,880	0.20
1980	494	3,045.7	830	613.5	2,502	0.25
1985	502	2,966.1	873	634.6	1,859	0.34
1990	514	2,824.5	899	583.9	2,016	0.29
1995	762	2,790.7	912	681.0	2,157	0.32
1996	817	2,964.9	960	729.2	2,179	0.33
1997	880	3,248.3	1038	814.6	2,179	0.37
1998	914	3,597.9	1135	912.9	2,203	0.41
1999	939	4,073	1262	1,059.0	2,237	0.47
2000	965	4,741.4	1448	1,292.5	2,328	0.56
2001	1,008	5,426.9	1633	1,461.6	2,478	0.59
2002	1,039	5,947.5	1774	1,503.9	2,410	0.62

In 1970, 18% of all children born 18 years earlier went to HEIs. By 1985 this indicator had increased to 34%, representing a significant achievement, although even then there were complaints of «inflation» in higher education, and cases of people with university degrees working in jobs, which did not require such a high level of qualification. By 2000 the number of entrants to HEIs exceeded half of the number of children born 18 years earlier and continued to grow. In 2002 there were 1.5 million HEI entrants, or 62% of all those born 18 years earlier (i.e. in 1984).

Meanwhile, the number of children born has been in decline for nearly two decades from a peak of 2.5 million in 1986. In 1990 the statistic went below two million and in 1993 below 1.5 million, since when the number of children born has been lower than the number of entrants to HEIs in every year without exception. The dwindling number of newborns from 1990 and after will start to enter HEIs in 2008, when recently created HEI capacities will be increasingly superfluous.

only two cities with more than two million inhabitants. The shortage and modest size of Russia's big cities is evidence of inadequate regional development in Russia, which has failed to produce strong regional and inter-regional capitals. There is now a migratory movement in the opposite direction as people «retreat» to a few large national centers, thwarting formation of large regional centers, which could give an impulse to development of their regions. The trend is not conducive to prosperity of small and medium-sized cities.

Russia badly needs more people, and although growth of production and use of knowledge can mitigate consequences of the unfavorable demographic trend to some extent, they cannot overcome all of the problems provoked by the absolute demographic deficit

Russia badly needs more people, and although growth of production and use of knowledge can mitigate consequences of the unfavorable demographic trend to some extent, they cannot overcome all of the problems provoked by the absolute demographic deficit.

While Russia's population is shrinking, its higher education system seems to be burgeoning (Box 4.1).

Low Fertility Makes Population Growth Impossible

In all industrialized nations there is an indisputable connection between reduction of the fertility and a general shift of emphasis from quantitative to qualitative characteristics of social life, particularly as expressed by increased demand for education and knowledge.

Growth of education and the related changes in way of life, child upbringing, consumption profiles, etc., lead to enormous increase of family expenditure per child (understood not only as cash expenditure, but also labor hours, emotional energy, etc.). Society's inputs to training of the young have also grown abruptly. And these developments have been accompanied by, on the one hand, rapid lowering of child mortality and, on the other hand, a considerable extension of the dependency period before young people start work.

This creates objective conditions for fertility decline. The more highly educated classes lead the way in reducing family size, and small families become more and more the rule with growth in the share of people, especially women, who have ever higher levels of education, and extension of this paradigm to the less educated classes. Investigations as far back as the 1970s predicted fertility decline in Russia, spreading from highly educated women to the whole of the population (see Table 4.3).

The connection between the level of fertility and growth of education levels in Russia is clear when it is remembered that people marrying in the second half of the 1960s were mainly born after WWII and were much better educated than all previous generations. Of course, it cannot be asserted that this was the only reason for low fertility levels, but it is one of the principal reasons.

Fertility indices in Russia fell quickly in the post-war period and dropped below replacement level in 1964, earlier than in most developed nations.

In this situation the onset of population contraction could only be a matter of time: positive natural increase could be preserved by inertia until the time when growth potential thanks to higher fertility in the past was exhausted. The moment of truth — the transition from positive to negative natural increase — came in 1992. Since natural increase of the population had been the main source of its general growth, contraction began at once.

The total fertility rate (TFR) in Russia in 2002 was the lowest since records were kept at 1.21 births per woman. In association with mortality levels, this gave generation replacement of just 57%. There has been a slight improvement since then to 1.32 in 2002, but it would be a mistake to pin any great hopes on fertility dynamics. Fluctuations in the TFR under the impact of ad hoc factors — demographic and non-demographic — may occur. But there are no grounds to believe that the TFR will rise to the replacement level (nearly 2.2 births

Table 4.3

Average Number of Children Desired by Russian Women who Plan to Have at Least One Child (1970s data)

When married	Level of women's education			
	higher and incomplete higher education	secondary general and specialized education	incomplete secondary education	primary and lower education
1960—1964	1.73	1.85	2.01	2.20
1965—1969	1.69	1.77	1.87	1.92
1970—1972	1.75	1.76	1.78	1.82

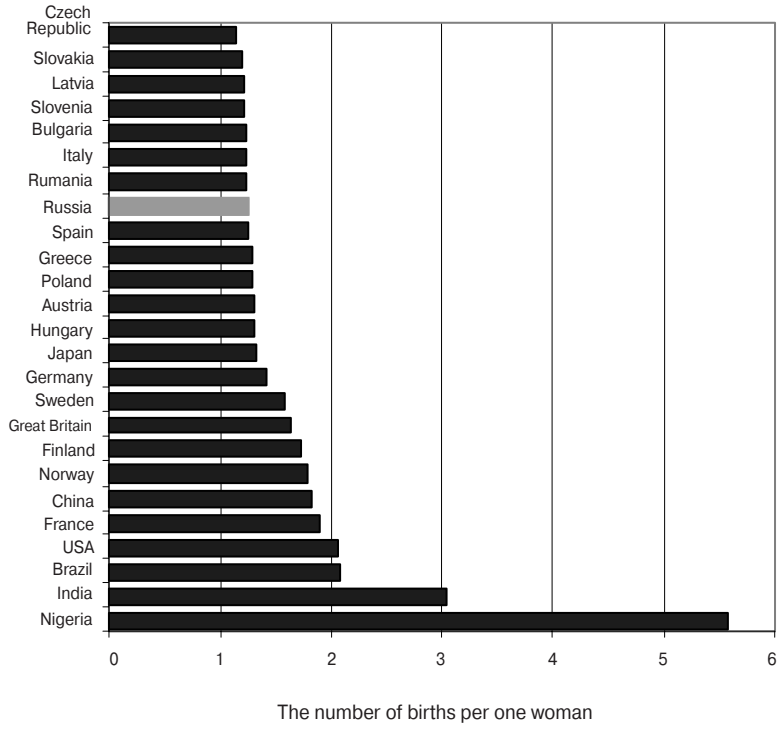
Source: How Many Children Will There Be in the Soviet Family? (Survey Results), Moscow, Statistics Publishers, 1977, p.59.

per woman), after being below that level since the mid-1960s.

Low, and recently very low fertility is characteristic of an overwhelming number of urbanized and industrialized countries with highly educated populations. At the turn of this century all developed countries, except the USA and New Zealand, had TFR below two children per woman, and in many cases their rates were as low as Russia. Fertility also fell below replacement level in some less developed countries with rapidly improving education levels, notably China. High and very high fertility are now exclusively the lot of developing countries with low urbanization in Asia, Latin America and Africa (Figure 4.2), although they are also seeing rapid decline.

Education levels show clear gender distinctions. In the European Union, for example, the share of women-students exceeds the share of men-students among men and women of the relevant age groups at all levels of education.

Figure 4.2. **Total Fertility Rate in Various Countries in 2001**



Knowledge is not yet Helping Russians to Reduce Mortality

High and increasing mortality levels are one of the clearest and most alarming trends in Russia today.

In the course of demographic modernization in the 20th century the process of extinction of generations changed in Russia as it did in other countries. By the mid-1960s mortality had fallen significantly compared with the start of the century. Life expectancy of both men and women had doubled (see Table 4.4).

Table 4.4

Life expectancy in Russia at the End of the 19th Century, in the Mid-20th Century and at the Beginning of the 21st Century

Year	Life expectancy, years		Improvement compared with 1896—1897, years	
	Men	Women	Men	Women
1896—1897	29.4	31.7		
1964—1965	64.6	73.4	35.2	41.7
2002	58.5	72.0	29.1	40.3

This radical reduction of mortality is one of the triumphs of knowledge. Death has been pushed back by the advance of knowledge, or more specifically by the medicines, and medical and hygiene procedures, which knowledge has produced. These factors enabled a historic breakthrough — the conquest of infectious disease. Infectious and acute catarrhal diseases, which were the main cause of death at all ages, particularly among children, have been overcome. Mortality in developed countries is now increasingly due to chronic diseases, particularly diseases of the cardio-vascular system or cancers, which tend to strike in later life. Life expectancy in all developed countries, Russia included, has increased dramatically due to this «restructuring» of the causes of death.

However, recent decades have shown that reduction of mortality by advances in medical science has its limits. When these limits are reached further progress depends on social measures. A new strategy, based on prophylaxis, is needed to combat increased mortality from non-infectious diseases, particularly cardio-vascular diseases and cancer, and also from accidents, violence, smoking, alcoholism and other similar causes not directly related to disease (Feature in the Chapter 4).

Social Aspects of Public Health

High risk of developing chronic non-infectious diseases is an important factor in Russia's unfavorable demography. The biggest negative contribution is from behavioral factors such as smoking and alcohol abuse, environmental factors such as the high level of psycho-social stress, and biological factors including high arterial blood pressure and excessive cholesterol levels.

Smoking is the chief removable cause of disease and premature death in Russia. Over 230 billion cigarettes are smoked in the country every year, putting Russia among the world's five leading countries for tobacco consumption. The share of men who smoke is consistently high at over 60%, which is one of the highest indicators in Europe and worldwide. Trends in tobacco smoking among women give special cause for concern. Before the mid-1990s the share of smokers among Russian women was traditionally lower than among women in European countries, not exceeding 5–15%, but most recent selective investigations show that almost a third of Russian women are now smokers. According to data of the World Health Organization, smoking will account for 70% of Russian mortality in the 2020s—2030s if current trends in tobacco consumption continue.

The smoking epidemic needs to be curbed by legislation, particularly increase of excises and a full ban on tobacco advertising. The share of taxes in the price of a packet of cigarettes in Russia is just 5% compared with 30—60% in countries with effective tobacco controls. Relatively low incomes and climatic conditions unfavorable for home-growing of tobacco suggest that elasticity of tobacco goods is close to 0.8, i.e. a 10% tax boost should reduce tobacco consumption by 8%. Given the disastrous effect of tobacco smoking on health in Russia, we are bewildered by delay in signing by Russia of the Framework Tobacco Control Convention. The delay is particularly strange, because Russia took part in talks on the Convention in May 2003 and was one of 192 signatories among WHO member-countries. Incoherence of state policy vis-a-vis the tobacco epidemic gives special urgency to formation of a broad national anti-tobacco coalition, including various government bodies, anti-smoking NGOs, lawyers, economists, and medical associations, to press hard for a legal clamp-down on tobacco.

Alcohol abuse is another major cause of disability and mortality. It can lead to depression, alcohol-induced pathology of the liver, heart, stomach and brain, damage to the kidneys, the peripheral and central nervous systems, blood and blood-forming organs, and bones, as well as malignant neoplasms in the liver, oral region, larynx, gullet, stomach and mammary gland. Accidents at work, road accidents, suicide, poisoning and traumas are often associated with alcoholism. It causes suffering to other family members, inducing neurotic states, depressions and psychosomatic afflictions.

Levels of alcohol consumption in Russia are now among the highest in the world at 12–15 liters of ethanol per person per year. But the accuracy of statistics is hard to judge because it is difficult to estimate volumes of home-made alcohol, contraband and adulterated alcoholic drinks. The number of people suffering from alcoholic dependence is increasing and there are over three million registered alcoholics. Alcoholism is spreading among the young and among women: the ratio of female to male alcoholics has altered from 1:10 at the start of the 1990s to 1:6 at present. Crimes committed in a state of intoxication and alcoholic pathology of internal organs are both consistently high. Alcohol-related mortality is on the increase (Table 1).

Table 1

Alcohol-related Mortality

	1998	1999	2000
Total mortality	31,600	37,200	47,500
Mortality among people of working age	24,400	28,300	37,000
Mortality per 100,000 people	21.6	25.5	32.8
Mortality per 1000 people of working age	28.6	33.3	42.8

Ineffectiveness of measures to reduce consumption of alcohol in Russia is due to high levels of alcohol dependency, social pressure from producers of alcoholic drinks, and aggressive marketing and advertising campaigns by the drink manufacturers, who often target a youth audience, leading to alcohol-oriented behavior among the young. Anti-alcohol campaigns by the state in 1958, 1972 and 1985 used harsh administrative measures and penalties, and provoked significant social opposition. Those earlier failures may be part of the explanation for current absence of a definite plan of action by the state for overcoming problems associated with alcohol abuse. There is a clear need for a new, flexible policy, which could reduce alcohol consumption to a socially acceptable, less dangerous level. Prices of alcoholic drinks should be moderately increased as the most effective way of reducing alcohol consumption by young people. The state should enforce tighter control over production and sale of ethyl alcohol and alcoholic drinks, and there needs to be a tough system of fines and criminal responsibility for illegal production and sale of spirits, false description of alcohol products and home-distilling for sale. Beer should be included in the list of alcoholic drinks and thus brought under this system of controls.

Deterioration of health and rapid rise of mortality in Russia at the start of the 1990s cannot be explained in terms of traditional risk factors. These negative developments are due to a sharp change in socio-economic status of most Russian citizens and to psycho-social factors. Most of the Russian population is exposed to a high level of psycho-social stress, which can induce a sense of hopelessness, loss of purpose, low self-esteem, depression and suicide. The number of suicides increased by almost 50% during the 1990s (Table 2) and prevalence of suicide is, for example, three or four times higher in Russia than in the US.

Table 2

Suicide Levels in Russia

	1970	1980	1990	1995	2000	2001
Total suicides (thousands)	38.9	47.9	39.2	61.0	56.9	57.3
Per 100,000 people	29.9	34.6	26.4	41.4	39.3	39.7

Slower growth of Russian mortality in most recent years may be due to economic stabilization and people's gradual adaptation to new conditions.

Russia's public health system is not oriented towards primary prophylaxis, i.e. it does not address risk factors. The emphasis is on giving medical assistance when it is requested, i.e. addressing the results of risk factors and not their cause. Ratios of hospital beds are still more adequate than almost anywhere else in the world, despite a significant decline since the early 1990, and Russia has more doctors relative to its population than most European countries. However, the number of outpatient departments and polyclinics and the number of physicians working in them has decreased. The existing imbalance in favor of expensive hospital treatment is thus being accentuated, making medical assistance less and less accessible for most people. Primary health care needs to be redirected towards prophylaxis with an emphasis on taking preventative care into society. That requires creation of a public health service and training of suitable specialists, not all of whom would need a medical education. For example, despite having one of the highest rates of HIV spread in the world over the past five years, Russia remains inadequately equipped to implement evidence-based, prevention measures aimed at behavior change (for more detailed information, please see the report on HIV/AIDS in Eastern Europe and the CIS, including Russia, «Reversing the Epidemic, Facts and Policy Options» UNDP, 2004 at www.undp.ru)

Unsatisfactory performance indicators suggest that techniques used by Russia's health service need to be reviewed. Many medical

and diagnostic techniques, which are widely applied, have never been properly tested to establish their efficacy. Such dubious techniques include acupuncture, hyperbaric oxygenation, low-intensity radiation treatment, and others. Even if such methods are «harmless», they do in fact cause harm, because they are being used instead of methods, whose efficacy is proven.

Medical practice, which allows a reasonable choice of interventions, is called evidence-based medicine, and is based on systematic search for and application of the best available methods of treatment and prophylaxis, taking due account of patients' individual preferences. Such a scientific, evidence-based approach is desirable not only in individual clinical cases, but also at the level of public health decision-making. Medical education in Russia does not place enough emphasis on clinical epidemiology and biostatistics — the main instruments of evidence-based medicine, — with the result that public health practitioners in Russia are still unsure about applicability of many evidence-based techniques. Another problem is that high-quality and reliable medical information is published chiefly in English, making it inaccessible for many Russian physicians. These problems are solvable. There are several ways to introduce evidence-based medicine. One way is to train specialists in evidence-based medicine, capable of independent inquiry and critical assessment of medical information. But that is an expensive and complex approach and the number of such specialists in the medical profession is bound to remain small (5—10%) both in Russia and elsewhere. It is more feasible to give health practitioners the possibility of finding the information, which they need, in existing scientific, evidence-based resources. More and more such resources are appearing in Russian and in accessible form. Finally, doctors can be encouraged to apply evidence-based medicine, without needing to hunt for relevant information, by copying the practice of experts: standards for diagnosis and treatment of patients, which use an evidence-based approach, can be taught by example. Such standardization is making very slow progress in Russia: to date only six protocols, describing a small number of clinical states, have been published. Faster introduction of evidence-based medicine in clinical practice will improve doctors' performance and raise efficiency of the Russian public health system.

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The prevention of the spread of HIV/AIDS represents an especially challenging problem that highlights the limits of traditional approaches to issues which ultimately depend on individual behaviors and confidence in a public health system accessible to all, including vulnerable groups. Success of the response to HIV/AIDS and other public health threats addressed above depends on increased awareness and attention by individual Russians to their own heath and increased public spending on health care and treatment. Indeed, more attention to these questions by the state has the effect of persuading individuals to look after themselves better (Box 4.2).

Western nations have successfully designed and implemented such a strategy. But Russia, both Soviet and post-Soviet, has failed to meet the challenge of finding new ways to counter mortality. After a period when the mortality gap between Russia and developed nations steadily narrowed, this gap has now widened once again, and by 2000 the gap between male life expectancy in Russia and in developed countries was greater in some instances than a century earlier (see Figure 4.3 and Table 4.5).

Box 4.2

«Mortality rates among adults depend largely on their pursuits and living conditions; a certain degree of tension, of even and persistent diligence, which is among the fruits of civilization, tends to lengthen life, whereas servile laziness reduces it».

Dmitry Mendeleyev, Cherished Thoughts, 1904

«The experience of policy measures for reduction of mortality inspires more optimism. Such efforts always bring success, as has been found in many countries, and the only question is whether Russian society and the Russian state are capable of arranging their priorities so that economic and other resources are used to assure the best-possible protection of life and health. Clearly, this is not yet the case.»

The Population of Russia in 2000. The Eighth Annual Demographic Report by the Center for Demography and Human Ecology, Moscow 2002.

Figure 4.3. **Male and Female Life Expectancy in Russia and in some Developed Nations in 1946—2007 (years)**

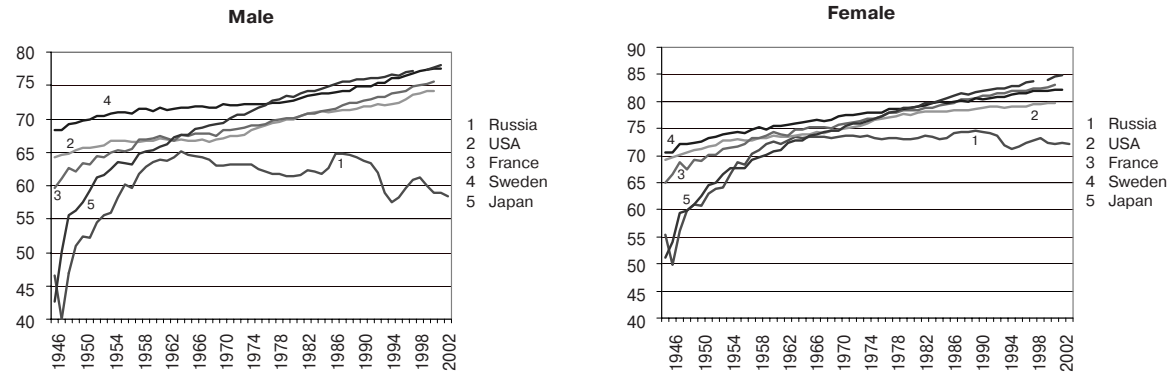


Table 4.5

The Life Expectancy Gap between Russia some Developed Nations at the Beginning and the End of the 20th Century (years)

Year	USA	France	Sweden	Japan
		Male		
1900	15.9	12.7	20.3	14.5
2000	15.2	16.5	18.5	18.7
		Female		
1900	16.2	14.1	20.8	13.1
2000	7.5	10.8	9.9	12.4

High mortality is a problem for all strata of Russian society, but not in equal measure. More educated people are less likely to die young, so the spread of education in Russia counteracts rising mortality to a certain extent (see Table 4.6).

Table 4.6 shows that, at 1979 mortality levels, the average Russian man with higher, incomplete higher or secondary specialized education and aged between 20 and 70 years was likely to live 4.04 years longer in 1979 and 4.07 years longer in 1989 than his less educated countryman. The respective differences for Russian women were 1.07 and 1.32 years. It the education level in Russia had not risen between 1979 and 1989, life expectancy of men between 20 and 70 would have risen by 1.26 years and that of women by 0.31. But since, in fact, educational make-up of Russian society improved over the decade, life expectancy of those aged between 20 and 70 years rose by more than that: by 1.61 years for men and 0.5 years for women.

Table 4.6

Average Years Lived between the Ages of 20 and 70 in Groups with Various Education Levels in Russia (1979 to 1989)

	1979	1989	Increase over the period
Male			
Higher, incomplete higher and secondary specialized education	43.51	44.79	1.28
Secondary general, incomplete secondary and primary education; persons without education	39.47	40.72	1.25
All groups 40.40 42.01 1.61			
All groups assuming the same educational composition of the population as in 1979	40.40	41.66	1.26
Female			
Higher, incomplete higher and secondary speculated education	47.028	47.82	0.54
Secondary general, incomplete secondary and primary education; persons without education	46.21	46.50	0.29
All groups 46.54 47.04 0.50			
All groups assuming the same educational composition of the population as in 1979	46.54	46.85	0.31

Source: Inequality and Mortality in Russia, Moscow, 2000, p. 37

There was no such improvement in educational make-up of society between the censuses of 1989 and 2002, so this factor, which tends to compensate rising mortality, was lacking in that period.

So education levels in society have a significant effect on mortality. But mortality, in turn, has major influence on formation of a knowledge-based society, since high mortality retards accumulation and use of knowledge. It is important that the knowledge, which a person obtains in the expensive process of training, should be used efficiently. Supposing, conditionally, that returns from knowledge obtained in childhood and youth occur mainly between the ages of 20 and 60, it is important to make the fullest use of these years. But high adult mortality in Russia shortens the time, which a person has for making use of his knowledge, so that the efficiency of spending on his education is diminished.

Nobody can live more than 40 years between the ages of 20 and 60, but the «average» person lives less because some people of 20 do not survive until 60. So expected lifespan of a person between 20 and 60 is a good indicator of how efficiently the knowledge obtained in childhood and youth is actually used (see Table 4.7).

Table 4.7

Life Expectancy of a 20-year-old Man between the Ages of 20 and 60 in Selected Countries

Country	Period	Life expectancy between 20 and 60 years of age		Excess compared with Russia		The share of «lost» time, %	
		Men	Women	Men	Women	Men	Women
Russia	2002	33.4	38.1	–	–	16.5	4.9
USA	1999	38.2	39.1	4.8	1.0	4.4	2.3
Germany	1997—1999	38.6	39.3	5.2	1.3	3.5	1.7
Japan	2000	39.0	39.5	5.6	1.4	2.6	1.3

Table 4.9 shows that the average Russian man can expect to live 4.8 years less between the ages of 20 and 60 than an American, 5.2 years less than a German and 5.6 years less than a Japanese man. Premature death deprives an average American man of 4.4%, a German of 3.5% and a Japanese man of a mere 2.6% of the maximal 40-year period, while an average Russian man loses 16.5%, or one-sixth of the time granted by nature. Damage from this «underutilization» of knowledge, abilities and skills, which every person accumulates at the earlier stages of his life, is very grave in Russia.

Russians not only die earlier; they are also more at risk of becoming invalids, which also shortens the time available for use of knowledge. According to WHO estimates in 2002, the disability-adjusted life years for a new-born boy in Russia are 52.8 years and for a new-born girl 64.3 years. In the USA the same indicators are 67.2 and 71.3 years respectively, in Germany 69.6 and 74 years, and in Japan 72.3 and 77.7 years.[1]

An Ageing Population Requires New Approaches to Knowledge Renewal

Vast changes in fertility and mortality patterns in all developed nations during the 20th century brought about a radical change in the age pyramid: the share of elderly people has grown to unprecedented heights, while the share of young people has diminished. All these countries have rapidly ageing populations. In Russia, the share of the elderly (60 years and above) has grown from 6.7% in 1939 to 11.9% in 1970 and to 18.7% in 2001. In many countries the share of the elderly is even higher: in the European Union it is 21.5% and in Japan 23.7%. Russia will soon show the same figures.

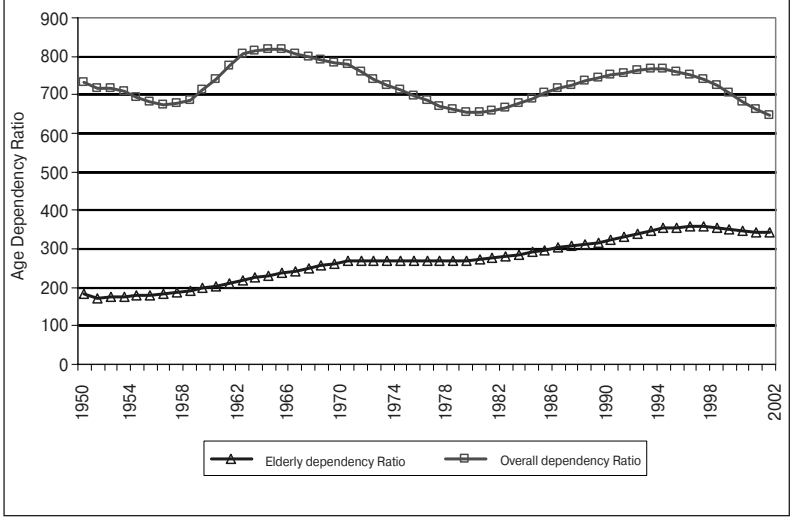
To what extent is this a dangerous development? Discussions of demographic ageing usually focus on the pernicious effect, which it can have on the status of pensioners and on the general economic situation in the respective country. It seems evident that a higher share of pensioners in society places an increasing, eventually unbearable, burden on the adult population of working age.

It is worth remembering, though, that the age dependency ratio is the ratio of both the elderly and children to the adult population of working age. And since increase in the share of the elderly is accompanied by reduction of the share of children in society, the overall dependency ratio changes very differently from the elderly dependency ratio.

The elderly dependency ratio in Russia has increased more or less smoothly in the last 50 years, though not without fluctuations. But the overall dependency ratio has seen a wave-like development (due to special features of the Russian age pyramid, in which evolutionary processes were distorted by extraordinary shocks in the first half of the 20th century). The tendency, though confusingly articulated, has been towards reduction of the dependency ratio, so that Russia is better off now, in this respect, than at almost any time since WWII. Indeed, even the elderly dependency ratio is currently shrinking and not growing (Figure 4.4). This is an important economic trump card for Russia today, deserving no less attention than, for example, the favorable price environment on world markets for primary energy.

However, this favorable situation will not last long, but will start to fade away in the second half of the present decade. Growth of the elderly dependency ratio will resume and speed up because larger generations, born after the war in the latter part of the 1940s, will reach 60-years of age. But even then reduction of the share of children in the population, due to fertil-

Figure 4.4. **The Age Dependency Ratio in Russia per 1000 adults (men aged 26—59, women aged 16—54), 1950—2002**



ity growth in the 1980s and its decline in the 1990s, will slow down growth of the overall dependency ratio, which will probably still be lower 30 years from now than it was in 1975, when it was not exceedingly high. The highest overall dependency ratio in Russia in the post-war period was in the first half of the 1960s, when it exceeded 800 dependents per 1000 adults. Such values will not recur before 2035, and even then only under certain possible scenarios. It is worth preparing for such developments, but they should not be perceived as disastrous. If Russia could cope with such a load in 1965, it will surely be able to cope with it 70 years later.

There is no denying that demands on the pension system are currently increasing, but that is no reason for presenting the «problem of ageing» as insoluble. It is a challenge that requires an adequate economic and social response. The development of pension systems in the 20th century was such an answer to new demographic realities, and it may be that society will have to face up to a completely new role for the pension system in mechanisms of resource redistribution between generations and within generations.

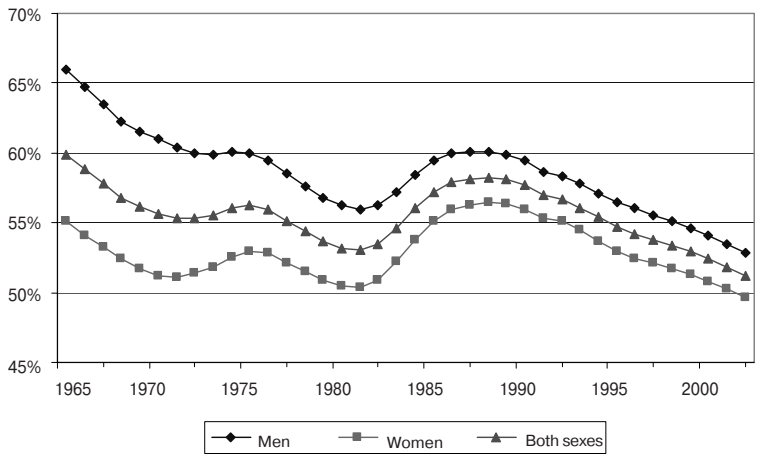
Pension issues should not be allowed to distract from other serious problems that arise from demographic ageing. The problem of knowledge renewal is central to such problems.

People are unable to keep pace with current advances in science and technology. They are already «behind the times» just 10 or 15 years after completing their education, and the flag-bearers of cutting-edge technology tend to be young graduates just out of college. However, ageing of the population is slowing down the influx of young people to the workforce. The age structure of the population group between 20 and 60 years-old, the most socially and economically active age group, is changing irreversibly (see Figure 4.5). In 1965, 75% of men and 55% of women in this group were less than 40 years-old, i.e. were in the younger half of the group. In 2002, this indicator fell to 53% of men and under 50% of women. There have been fluctuations in the indicator over the last two decades, but it has never regained its mid-1960s level, and the future will bring further declines.

The older age groups, which are increasing their share in the active population, are to some extent bearers of obsolete knowledge, and his can lead to slower renewal of knowledge in society as a whole. This tendency will increase if the government implements proposals to raise the age of pension entitlement. Because of this, demographic ageing poses new tasks for the education system. Various techniques for retraining and upgrading knowledge levels throughout people's working lives already exist. But new demographic conditions make such training and retraining much more important. Russia's system of education and vocational training has to be ready for this challenge.

What we said previously about premature death and low indices of disability-adjusted life years in Russia makes it clear that the challenge of knowledge renewal is not only a challenge for the education system. Professional training and retraining of people over 40 will only be successful and justified if they are in good physical and mental shape and have real prospects of using their new or updated knowledge for a long period into the future.

Figure 4.5 **The Share of 20—39 year-olds in 20—59 Age Groups**



International Migration: Another Challenge to Reproduction and Use of Knowledge in Russia

Russia has always had a fairy intensive external migration exchange, but in Soviet times it was limited to inter-republic flows inside the USSR. That entailed outflow of some qualified specialists from Russia to help economic and social modernization of other

republics, particularly in Central Asia, which was, in effect, a «brain drain», although it was not seen as such at the time. On the other hand, there was a movement in the opposite direction as big Russian cities, particularly Moscow and St. Petersburg, as well as other economic, scientific and cultural centers in Russia attracted the best personnel from Ukraine, the Baltic Republics, the Transcaucasian Republics, etc.

There has been a radical change since disintegration of the USSR and fall of the iron curtain as Russia has joined the system of international migration. Emigration of Russian scientists and qualified specialists to the West represents a classic brain drain. There are no exact data on its scale, but the number of scientists who have emigrated is sometimes estimated at tens of thousands. Such mass departure is bound to impact seriously on scientific and industrial centers, which have lost a sizable part of their qualified specialists. On the other hand, emigration by representatives of the Russian intellectual elite is not necessarily all bad for Russia's «knowledge universe». It represents inclusion of Russia in the international system of exchange of scientists and specialists, which has long existed between developed nations. This contributes to expansion of international scientific and technical cooperation and to emergence of Russian scientific and technical thought from its Soviet isolation.

Another important point is that disintegration of the USSR has caused inflows to Russia of ethnic Russians and Russian speakers from the former Soviet republics. These are generally well-educated and qualified people, offering an important resource for the knowledge economy, though a resource which is patently underrated and inadequately used to date.

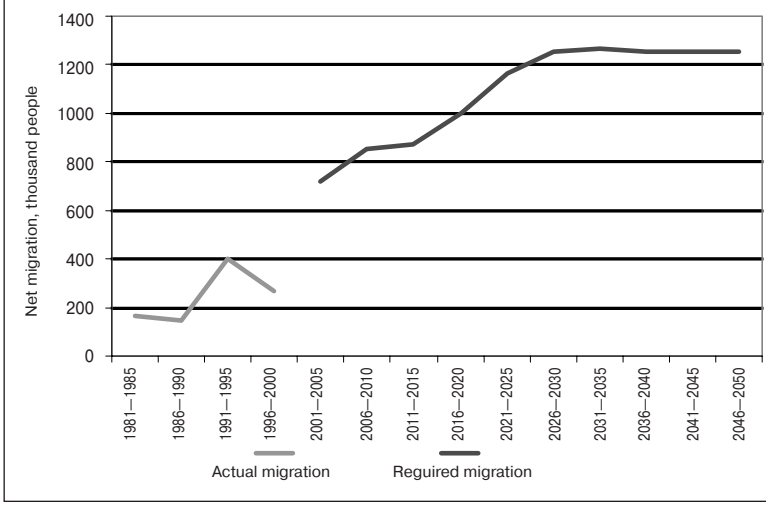
But Russia's current demographic realities, like those of other developed countries, entail a need for greater and more diverse immigration than is now occurring. Without this, the country will be unable to halt or even slow down its population decline.

Available estimates suggests that maintenance of Russia's population at the level of the beginning of the 21st century — 146 million — requires net migration (difference between inflows and outflows) of over 700,000 people a year from the first year of the 21st century, gradually increasing to 1,200,000 or 1,300,000 people a year in 2030—2035 (see Figure 4.6). These figures are approximate, but the orders of magnitude are correct.[2]

Current immigration levels are far lower, and Russian society seems unwilling to accept larger inflows of migrants. But that might change as the necessity becomes more and more evident. If, under pressure of circumstances, Russia begins to accept large numbers of immigrants, following the current example of the USA and Germany, the challenge of their adaptation and integration will be among the most crucial social issues for the country.

Russia is currently less than hospitable towards citizens of former Soviet republics, including those who are ethnic Russians or Russian-speaking: it is failing to attract immigrants from the former Soviet republics, for whom cultural adaptation in Russia would not be difficult. But people are and will continue to be among the most valuable and scarce resources for Russia in its current demographic situation. As this resource is exhausted in former Soviet republics, there are bound to be more and more newcomers from the Third World, who are quite remote from Russians in language, culture, religion, mentality and education standards. Considering the further fact that new immigrants always face a lower legal and economic status compared with established inhabitants, it is inevitable that acceptance by Russia of big migration flows will lead to serious social tensions and conflicts.

Figure 4.6. **Annual Net Migration: Actual in 1981—2000, and Necessary in 2001—2050 to Maintain Population Size (Median Values of a Series of Forecasts), Thousands**



In view of all these factors, Russia will have to choose between two alternative strategies. It could restrict the flow of immigrants as far as possible: if there are no immigrants, there will be no assimilation problems. This will match the anti-immigration mood in society, and main efforts will be focused on restricting and limiting immigration, tightening rules for entry and residence in Russia, etc. Law-enforcement agencies will probably be zealous in implementing such a strategy, although their task will not be easy: migration pressure from overpopulated countries will grow, and Russian businessmen will have increasing incentives to bring in cheap labor, so law-enforcers will be fighting on two fronts. And if they are successful in restricting immigration to the country, the question remains of how good this will be for Russia. To close all doors to immigrants is to acquiesce in continued reduction of the population, its ageing, loss of Russia's place in the world demographic hierarchy, and worsening of the correlation between population and territory. These factors must be considered in designing a Russian migration strategy.

If Russia decides to admit increasing (though not unlimited) migration flows, special measures will be needed to avert resulting conflicts by accelerated adaptation of the newcomers: instruction in Russian language, «grafting» of rules for behavior in everyday life and the value system of modern Russia. The front line in this case will not be the police force, but the Russian system of education and, in a broader sense, the entire system of production and use of knowledge.

The reduction of numbers of children and young people in Russia at present means that the country's education system has excess capacities, which could be used for «russifying» migrants, helping them to acquire necessary skills for work in industry, construction and services, offering them secondary specialized and higher education, assimilating their children in Russian schools, pre-school and other educational establishments, and for building a broad network of Russian language courses for foreigners, etc. These challenges need to determine government social policy. If there is migration without such policy, the inflow of poorly educated migrants will lower the general level of knowledge in the country and complicate transition to a knowledge-based society. But if migrants can be drawn into the process of improving the level and quality of the country's education and population, their human potential will be added to the huge subsoil assets of Siberia as an additional, and equally valuable, source of Russia's future wealth.

* * *

Russia's current demographic situation and its long-term development tendency is one of the main challenges, which Russian society has to meet in the 21st century. The challenge has to be met on two levels, which might be referred to as «qualitative» and «quantitative».

The «qualitative» level requires adjustment of Russia's economic and social institutions to the new demographic conditions. Knowledge-based development has a special role here, because it achieves results by know-how instead of by force of numbers, partially compensating for unfavorable quantitative changes by improving the quality of the population and of human potential as a whole. The challenges in this respect are improvement of health, increase of life expectancy, raising of education levels and improvement in the structure of education — all necessary conditions for growth of labor productivity by application of the latest science and technology, allowing current generations to leave the best possible heritage to their descendants despite numerical disadvantages.

But there also has to a «quantitative» initiative, which can slow contraction of Russia's population, and ideally stabilize the population level. To some extent this can be achieved by growth of fertility and reduction of mortality, but the main real resource here is migration. Indeed, the migration resource is endless, but the problem is to design a good strategy for hosting immigrants and ensuring their smooth integration. Solution of this problem also depends on knowledge-based development, which implies maximum use of continuous education as the most effective instrument for social and cultural integration.

[1] The World Health Report 2003: Shaping the Future, WHO, 2003, Appendix 4.

[2] The population of Russia in 2001, Moscow, 2002, p. 181.

Protection of Intellectual Property in Russia's Public Health System

On April 5, 2004 the World Health Organization held the first meeting of its Commission for Intellectual Property Rights, Innovation and Public Health in Geneva. Addressing members of the Commission Lee Jong-wook, Director-General of WHO said: «Making treatments available for diseases associated with poverty has been a major priority for WHO ever since the organization came into existence. These diseases confront us with highly urgent needs that are usually extremely difficult to meet. Bold and innovative thinking is required — not only to find technical solutions but to find economic, social and political ones as well».

Because of its specific development, Russia only began to view protection of intellectual property rights as a major issue quite recently, and interest in the question was largely conditioned by arrival of foreign companies on the Russian market. Russia now cooperates with several international organizations responsible for the regulation and protection of rights to intellectual property: the World Intellectual Property Organization, the Coalition for the Protection of Rights to Intellectual Property and the Association of International Pharmaceutical Producers. Russia has signed many international conventions on protection of intellectual property, chief among them being the Paris, Berne, Madrid and Geneva Conventions. Relevant legislation has been adopted and gradually improved (Law on Copyright and Related Rights № 5351-1 of July 9, 1993, Patent Law № 3517-1 of September 23, 1992). A patents service has been set up and reformed, and various other necessary agencies have been created. But these steps have not been enough to completely overcome the problem of intellectual property violations in Russia.

Various reforms at the beginning of 2004 have changed the system of intellectual property protection in Russia. The head of Rospatent, the Russian patent office, was replaced; the office was renamed as the Federal Service for Intellectual Property, Patents and Trade Marks; and it was subordinated to the Ministry of Education and Science. There were also changes in the Russian Customs Service, which is largely responsible for combating import of counterfeit products. Operations of the Commission for Intellectual Property were stopped and proposed amendments to some laws were suspended . These changes may potentially affect regulation of rights to intellectual property in Russian medicine.

Medicines and other articles intended for medical use are among a large number of items that are bought and sold inside Russia in violation of intellectual property rights. But protection of intellectual property in Russian public health is extremely little-studied. This is due to the multidisciplinary nature of the problem, to the relatively small amount of intellectual property that is generated in Russia and could be of international interest, and also to influence of one of the worlds' most powerful lobby groups — multinational pharmaceutical companies, which are often interested in promoting a one-sided view of the situation.

Registration of foreign medical goods on the Russian market is largely regulated by the Order of the Ministry of Public Health of Russia № 23 (January 23, 1996). An Instruction issued in 1998 permitted refusal of registration for imported goods, which have analogs made in Russia, thereby complicating the registration procedure and probably increasing the cost of supplying imported medical goods to the Russian market.

Another important factor, which influences both protection of intellectual rights in pharmaceutical production and knowledge levels in Russian public health, is relative isolation of Russian medical science from international science. There is still a habit of distinguishing a so called «Russian school» of medicine from the «Western school». This state of affairs and the outlook of the Russian medical community have deep roots in the Soviet period, when the priority given to health in the economy steadily diminished with concurrent reduction of financing, preventing an adequate exchange of knowledge and experience with foreign colleagues. Russian medicine became isolated from developed countries, which own the greater part of intellectual property in medicine. This isolation has survived the fall of the iron curtain, since most Russian doctors have no command of foreign languages, lack access to databases, even to free ones (e.g. PUBMED), and are not skilled in retrieval and critical assessment of information. The isolation of Russian medical science creates favorable conditions for abuse of intellectual property by some people in the medical profession and by businessmen, who have full access to international information sources.

Intellectual Property in Medicine

Intellectual property in health care can be understood very widely: from chemical formulae for medicines and techniques for using them to architecture of children's hospitals or keep-fit campaigns in the media. But the most frequently discussed and most disputed intellectual property rights in Russian medicine concern pharmaceuticals and medical equipment, as well as publications in paper or electronic format.

It is important to note that market mechanisms and competition operate rather differently in medicine than in most other goods and service markets. Someone who wants to buy a mobile phone compares similar phones to find the lowest price, but decision-making on the market for medicines is more complicated. Greater informational asymmetry and heterogeneity of services means that a consumer might choose the more expensive of two analogous medicines, because the higher price would be regarded as indicator of higher quality.

Production of Intellectual Property in Russian Medicine

Because of its specific development path, described above, Russian medical science does not produce much intellectual property. There is a lack of specialists who can carry out research to test efficiency of treatments, and most medical practitioners do not understand clinical epidemiology and biomedical investigation. Investments in development of new medicines are comparably small. So most of the patents, which Russian medical specialists obtain, refer either to treatment methods with unconfirmed efficacy or to generics.

Medical publications in Russia generally fall short of standards that are expected in established English-language journals, and are largely based on Western publications. Plagiarism is not infrequent.

Generics

Generics are medicines that are unprotected by international patent. They are exact analogs of the original brand in respect of their main active substance, and usually come into production after the patent has elapsed. In some cases the analog is produced in violation of intellectual property rights or those rights are inadequately protected. Specifically, Patent Law of the Russian Federation № 3517-1 (September 23, 1992) lays down that the Russian government can use property rights without consent of the owner when that is essential for protection of national security.

Generics offer a way out of tragic situations for the world's poorest countries, because they are as effective as brand medicines and cost considerably less. For instance, metronidazolum made in Russia costs about three rubles per pack (about 10 cents), whereas many brand analogs cost over 1000 rubles (approximately $30). A course of combined therapy against AIDS using original medicines costs about $5,000-7,000 a year in Russia (depending on the combination of medicines), while similar courses of generics recommended by WHO and used in some countries (such as Brazil, India and Ukraine) cost between $400 and 1,700.

Generics encourage competition and thus lower prices for brand medicines, which leads to opposition from the pharmaceutical lobby and appeals by that lobby for stronger protection of intellectual property. A favorite argument used against generics is that they can be inferior in quality or clinical efficacy to brand pharmaceuticals, since they are not subjected to major clinical trials (regulation is limited to the Good Manufacturing Practice standards). Another major argument is that the big pharmaceutical companies will not make large investments in research and development of new products unless their rights to sales of the new substances are adequately protected.

Methods of Treatment Without Confirmed Efficiency

Russia and other parts of the former USSR have recently been inundated by various forms of fraud medicine with no scientific confirmation of its efficacy. Many of these practices are patented. Typical examples are the patent for Chizhevsky's air ionization device, biophytothermal treatment equipment, various techniques of improved hyperbaric oxygenation, as well as instruments of quantum therapy. The efficacy of these and many other such techniques is not confirmed.

The problem does not necessarily concern patents and intellectual property rights. For instance, a much-advertised method for treating arterial hypertension and other diseases using zirconium bracelets is not patented — the factory patent is only for production of zirconium for jewelry. But many quack therapies not only cheat money out of sick people, but also encourage them to do without proper treatment. And patents can be used as an extra argument for deceiving credulous consumers.

A host of analog medicines produced in Russia, and many imported medicines that have patent protection, are no longer used in more developed Western countries. This issue is often related to «mimicry», which has become a popular marketing-move in Russia. An example of mimicry is the medicine, marketed under the name «bralanginum», which is barely distinguishable from baralginum by name and packaging. This has obvious implications for protection of intellectual property, but the main issue, as we see it, is a very real threat to people's health, because both products contain analginum (Dipyrone), whose serious side effects caused baralginum to be withdrawn from the market in developed countries.

Publications

Less attention is paid to the problem of plagiarism, particularly the use of Western scientific materials and publications without adequate reference to the original sources. In some cases (for instance, translations from internationally established journals and text-books) statement of references would necessitate payment of a royalty. This illegal behavior might deserve censure, but the benefits in many cases would outweigh the damages from the public heath viewpoint. Financing of Russian state institutions is such that payment of royalties to Western rights holders is almost impossible, and the lives of many people depend on timely availability of the evidence.

Conflict of National and Transnational Interests

The protection of intellectual property is not an end in itself, but an instrument for stimulating innovation. The extremely powerful lobby groups of pharmaceutical producers, whose revenues sometimes exceed national budgets of small countries, often use dubious arguments to advocate tightening intellectual property protection in Russia. Their key argument is the one referred to above, that the pharmaceutical industry will not make extensive investments in designing new products unless its rights to market these products are adequately protected. However it is not really clear to what extent protection of rights to intellectual property in Russia (and in other countries where people have relatively low personal incomes) will encourage development of new products by the pharmaceutical giants.

Intellectual property rights are a key issue in negotiations over Russia's accession to the World Trade Organization, and economic losses from protracted delay in accession may entail serious losses for the nation's health: improved economic and social welfare has much more potential for improving health levels in Russian society than some increase in availability of medicines. However, Russia should weigh the options carefully before agreeing to international standards of intellectual property protection, since acceptance of international conventions and rules, which have often been lobbied by industrial interests, including those of pharmaceutical producers, may threaten national security. Consequences for public health need to be a factor in decisions about protection of intellectual property, although they are naturally only one among many relevant factors.

The priorities for Russia today need to be: improvement of evaluation methods so that medicines and treatments with effects that are not confirmed by proper evidence are not allowed onto the market; reasonable and gradual transition to civilized standards in protection of rights to intellectual property in medicine; and (simultaneously with the previous point) development of the market for inexpensive medicines, including some manufactured locally.

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Chapter 5.
Education and the labour market

Knowledge-based development depends on tertiary education, and in Russia that consists of special tertiary, professional tertiary, and post-graduate education (cf. Box 5.1).

As stated in a recent World Bank report on knowledge and development: "...the role of the tertiary education in construction of knowledge economies and democratic societies is more influential than ever. Indeed, tertiary education is central to the creation of the intellectual capacity on which knowledge production and utilization depend and to the promotion of the lifelong-learning practices necessary to update individual knowledge and skills".[1]

Russia's problem is that the high quantitative tertiary education indicators are not reflected by indicators measuring economic development level and living standards. One interpretation of this is that rapid growth of tertiary education in the 1990s has not yet had time to make an impact, and the returns will make themselves felt in coming decades. But this explanation is unconvincing, since levels of education in Russia and the USSR were also quite high in the past. The most probable explanations for disparity between education levels and economic development level are therefore low quality of education or inefficiency of the labor market (preventing proper use of the fruits of education) or both.

Unfortunately, both the quality of tertiary education and the efficiency, with which it is used by the labor market, are hard to measure. Researchers must rely largely on indirect indicators. But these are sufficient to reveal some evident weak spots in education quality and labor market efficiency, and to define some priority measures for overcoming them.

Reform of the tertiary education system is particularly high on the agenda since Russia's adhesion, in September 2003, to the so-called Bologna Convention on Education. Among other things, the Convention calls for establishment of two levels in the system of higher education and for unification of education programs (cf. Box 5.2).

Box 5.1

Under the International Standard Classification of Education (ISCED) of 1997, tertiary education embraces Level-5 and Level-6 programs, with Level 5 dividing into programs of type 5B and 5A. In UNESCO and OECD documents Russian tertiary education of type 5A is called "professional tertiary"; tertiary education of type 5B is called "special tertiary". Professional tertiary education (type 5A) is provided by so-called "higher educational institutions" (HEIs), special tertiary education (type 5B) is provided by so-called "medium special educational institutions" (MSEIs) (cf. Annex to Chapter 5 (A-5.1) Table 1).

Demand for tertiary education has been growing rapidly in Russia since 1992, in line with global trends. Indeed, some headline statistics make Russia the most highly educated society in the world at the start of the third millennium.2 The overall percentage of Russians with tertiary educational attainment is higher than in any developed country (cf. Table 5.1). The share of persons with tertiary-type A and post-graduate educational attainment is inferior only to the USA, Norway and the Netherlands, and Russia is expected to take the lead by this measure in the next few years.

Trends in Demand for Tertiary Education

Putting Russian national education categories in conformity with ISCED is technically quite complex, so we shall mainly keep to standard Russian terminology, which deals in types of educational institutions rather than the level of education programs. The main types of institutions,

Table 5.1.

Percentage Share of People Aged 25-64 with Tertiary Educational Attainment in OECD Countries (2001) and Russia (2002)

Indices	Tertiary education total (ISCED Levels 5 and 6)	ISCED Level 5B	ISCED Levels 5A-6
Russia	54.0	33.5	20.6
Maximum OECD	41.6[1]	21.6[2]	28.3[3]
Median OECD	24.1	9.0	14.8
Minimum OECD	8.9[4]	0.6[5]	6.6[6]

[1]Canada. [2]Ireland. [3]USA. [4]Turkey. [5]Slovakia. [6]Portugal.

Calculated from: Education at a Glance. P.: OECD, 2003, tab. A3.1a: Results of the 2002 National Census in Russia (http://www.gks.ru/perepis/osn_itog.htm).

Box 5.2.

Joint Declaration of European Ministers of Education Convened in Bologna on 19th June, 1999

...We engage in coordinating our policies to reach in the short term, and in any case within the first decade of the third millennium the following objectives...:

- Adoption of a system essentially based on two main cycles. Undergraduate and graduate. Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years... The second cycle should lead to the master and/or doctoral degree as in many European countries.
- Establishment of a system of credits – such as in the ECTS system – as a proper means of promoting the most widespread student mobility.

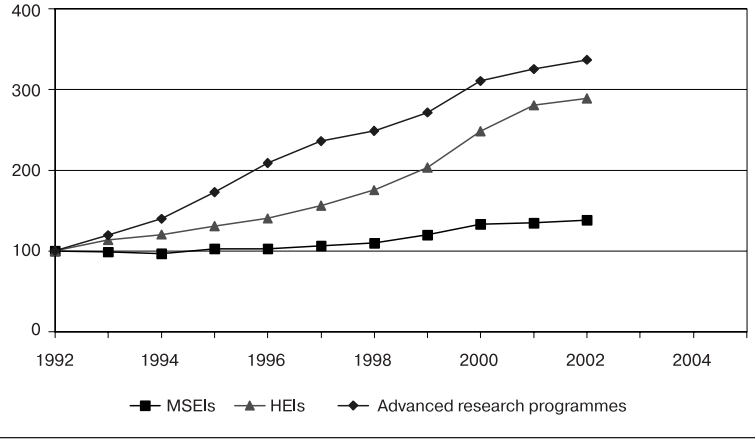
which we will refer to, are special tertiary (type 5B) educational institutions (MSEIs), professional tertiary (type 5A) educational institutions (HEIs) and post-graduate institutions (offering advanced research programmes).

Demand for tertiary education in Russia began to decline in the latter part of the 1980s, reaching its low point in 1992, after which it began to grow intensively.[3] Between 1992 and 2002, number of entrants to MSEIs went up by 40%, to HEIs by 190%, and number of entrants to advanced research programmes rose by 240%. The higher the level of education, the higher has been the growth in demand.

The absolute rise in demand for tertiary education was predicated, in part, on demographic processes. The number of births in Russia grew rapidly in the second half of the 1970s and early 1980s. It stabilized in 1983–1987, and began to drop intensively in 1988. As a result, by the late 1990s the number of young people of the age most typical for enrolment in MSEIs and HEIs (17-19 years) had risen by 15–20% compared with the beginning of the decade. Stabilization in numbers of young people of this age in the early 2000s, reflecting stabilization of the number of births in the mid-1980s, caused some slackening of the growth rate in number of entrants to tertiary educational institutions (MSEIs and HEIs) in 2001-2002.

As absolute demand for tertiary education reacted to stabilization in numbers of people of the relevant age in the late 1990s and after 2000, demand for tertiary educational services approached saturation point. Reliable demographic forecasts show that, if the level of demand for tertiary education among the relevant age groups stays as it is now, there will be an absolute decline in MSEI entrants starting from 2005 and in HEI entrants from 2006.

Figure 5.1. **Number of Entrants to Tertiary Educational Institutions, 1992 = 100**



a) Full-time and part-time

A parameter of tertiary education, which has special importance for functioning of the labor market, is the ratio of students enrolled on full-time programs to students enrolled on some part-time basis. The latter include students who attend evening courses, correspondence students, and those who sit exams to receive a qualification without following the relevant courses (this practice first appeared at the start of the 1990s and has become increasingly widespread). Clearly, those who are enrolled in part-time programs combine their studies with work or, at least, are available on the labor market. It is certainly true that many full-time students also began to combine work with study in the 1990s (cf. Box 5.3). The actual number of full-time students who work is not known, and additional research is needed. But we are warranted in assuming that the percentage of those who work (or want to work) among students attending full-time programs at MSEIs and HEIs is considerably lower than among students attending non-full-time programs.

The share of full-time students among all new entrants to MSEIs and advanced research rogrammes rose markedly in the mid-1990s to about 73% and stabilised afterwards. Meanwhile, the share of full-timers among new entrants to HEIs dropped from 64% in 1993 to 52% in 2002. Part-time professional tertiary (type 5A)

study seems to have become excessively prevalent in Russia, as can be seen from international comparisons. The reasons for the sharp decline in the share of full-time students lie in gender structure of demand for tertiary education.

b) Gender Characteristics

There is a belief that growth in demand for tertiary education, particularly since the mid-1990s, is largely explained by desire of young men to defer their military service. But this has not in fact been a major factor shaping overall dynamics of demand, as can be seen from analysis of change in the gender structure of demand for tertiary education by levels (MSEIs and HEIs) and by the full-time/part-time distinction.

On the whole, young men and young women have increased their demand for tertiary education at almost the same rate (cf. Table 5.2). And both sexes have increased their preference for professional tertiary (type 5A) education as compared with special tertiary (type 5B) education. However, the picture as regards the full-time/part-time distinction is more complex. Students of HEIs – both men and women – prefer part-time to full-time tuition. Higher demand among men for MSEI studies has been focused on full-time programs, while demand from women for special tertiary (type 5B) education has not significantly increased, whether full-time or part-time.

Overall the popularity stakes for various forms of study are as follows: fastest growth has been in demand for part-time instruction at HEIs (318% among women, and 253% percent among men); then comes demand for full-time education at HEIs (up by 193% among women and 180% among men); followed by male demand for full-time education at MSEIs (up by 170%); and the slowest growth has been in female demand for MSEIs (120% growth of part-time and 115% growth of full-time). Clearly many girls prefer to become part-time students at HEIs rather than entering MSEIs.

As a result, the female share in MSEI studentship dropped from 60% in 1994 to 53% in 2002 (from 61% to 52% at full-time programs and from 59% to 56% at part-time programs). At the same time, female presence in HEIs rose significantly, from 53% in 1994 to 58% in 2002 (from 49% to 51% at part-time programs and from 59% to 65% at full-time programs). There have been similar tendencies since the mid-1990s in the structure of demand for advanced research programmes. Share of women increased from 42% of all post-graduate students in 1997 to 45% in 2001, and from 30% to 41% of all doctoral students between 1995 and 2001.

Box 5.3

"Today, 2-3% of first-year students are working on a permanent basis, 12-13% have permanent jobs in their second year, nearly half of them in the third year, and up to 80% of students at full-time higher educational institutions are working in their fourth or fifth year. This is clear from our research at Moscow higher education institutions. The implication is that students who stay glued to their text-books and synopses in the hope of graduating with the best degree cannot find jobs any more than students who spend all their time out of lectures enjoying themselves. Today the market does not want people who can study – it wants people who can work. Graduates without work experience need at least two or three years to adapt to labor market requirements and start earning wages equal to their course-mates who do have work experience."

Leonid Kravchenko, Director, Moscow Labor and Employment Center. Izvestia, 26.01.2002, № 12-M, p. 14.

c) Fields of education

The structure of demand for different fields in tertiary education is obviously a crucial factor for development of the knowledge economy. ISCED-97 (see Box 5.1 above) specifies eight broad fields of education, which divide into 25 narrower fields and then subdivide into 80 specific fields, each of which has a relevant list of programs. This classification is uniform for all levels of professional education (primary, secondary, and tertiary). For purposes of analyzing main trends in choice of specialization in Russian tertiary education, we split the eight ISCED-97 fields into two groups,

Table 5.2.

Growth in the Number of Tertiary Students by Types of Educational Institutions, Full-time or Part-time Modes of Education, and Gender (2002 as % to 1994)

Sex	Total tertiary	State MSEIs			All HEEs		
		Total	Full-time	Part-time	Total	Full-time	Part-time
Total number	187	133	137	124	225	186	291
Men	186	158	170	131	203	180	253
Women	188	117	115	120	245	193	318

which can be referred to as "social fields" and "natural fields". Social fields contain ISCED fields 1-4 (education, art and the humanities, social sciences, business and law), and natural fields contains fields 5-8 (natural science, engineering, agricultural disciplines, health care, etc.).

Demand for social fields has grown much faster than demand for natural fields at all levels of tertiary education

Demand for social fields has grown much faster than demand for natural fields at all levels of tertiary education (cf. Table 5.3). There were also significant differences between growth of demand for various disciplines within the two groups: in social fields demand grew fastest for law, economics and management, and related themes; in natural fields there was a surge in demand for IT, maintenance, and ecology and environmental management. The main shift, though, during the past decade was from natural fields towards social fields.

Thanks to these changes, tertiary education in Russia has moved away relatively quickly from the traditional Soviet bias towards technology (particularly defense-related) and approached a typical market-economy structure

Thanks to these changes, tertiary education in Russia has moved away relatively quickly from the traditional Soviet bias towards technology (particularly defense-related) and approached a typical market-economy structure (cf. Annex to Chapter 5 (A-5.2) Table 2). In 2002 the share of social fields in total number of entrants was 47% at MSEIs, 63% at HEIs, and 49% for advanced research programmes (note that in Russia the field of specialization is determined at entrance to tertiary educational institutions).

To summarize, structural features of demand for tertiary education in Russia now differ little from elsewhere in the world – the distinctions are no more than one would expect in view of national specifics. The only alarming symptom seems to be an excessively high percentage of female students in part-time education. Other than that, Russia's tertiary education structure seems to be perfectly satisfactory.

Table 5.3.

Growth Rates in the Number of New Entrants to Tertiary Education Institutions by Fields of Education, 2002 as % to 1992

Institutions	Total	«Social» Fields	«Natural» Fields
State MSEIs	132	146	122
HEIs	289	448	179
Post-graduate programs	339	461	269

Supply in the Market for Tertiary Education

The education system as a whole reacted quickly to the strong growth in demand for tertiary education and changes in structure of that demand. The first significant development was growth in supply of services by non-state educational institutions. However, although the rate of growth in admissions to non-state institutions has exceeded the rate of growth in admissions to state MSEIs and HEIs, the non-state share in tertiary education remains fairly negligible and is likely to stay that way in the future. In 2002, non-state MSEIs (which first appeared in 1995) accounted for only 4.3% of new entrants to MSEIs, although there is likely to be some further growth in coming years. Non-state HEIs (which officially began to function in 1993) accounted for 13.6% of new entrants to HEIs in 2001, but showed no further growth in 2002. It seems that growth in the share of non-state HEIs has already reached a ceiling.

The share of private establishments in tertiary education varies widely between countries. Some countries, such as Great Britain, have no state establishments, while others, such as Canada, have no private establishments (cf. Annex to Chapter 5 (A-5.2) Table 1). The share of students in Russia attending private educational institutions of type 5B is close to that in the USA, while the closest match at type 5A is France. In any case, the private sector share on the tertiary education market is not an indicator of the *quality* of the services offered.

A much more significant process has been huge growth in payment for tertiary education. Unfortunately, it is impossible to tell exactly how big this market is, since payment is often unofficial. All that are available are official data of dubious reliability on the number of student places, financed from the state budget, and all other, «non-budget» (paid) places, which are described in official terms as places «with full compensation of tuition expenses by students themselves». All student places at non-state MSEIs and HEIs are paid, since tuition costs there are fully covered by students or their parents, but a significant proportion of student places at state educational establishments are also paid.

It is important that the formula «full compensation of tuition expenses» is far from covering the entire spectrum of paid services in tertiary education. To say nothing of the process of entering HEIs, many public MSEIs and HEIs also take tuition fees from students with places that are financed from federal and sub-federal budgets (this is referred to as «partial compensation of tuition expenses»).

Admission to budget-financed places at MSEIs was in decline until 1998. There has been some increase in 1999-2002, but the number of budget-financed places in 2002 was 18% lower than in 1992. Admission to budget-financed places at HEIs gradually rose, going up by 29% from 1992 to 2002. But since total HEI enrolment leapt 2.9 times in the same period, it is clear that surging demand for tertiary education in the 1990s was almost fully met by the increased supply of paid educational services in both the state and non-state sectors. By 2001 the share of admissions to places «with full compensation of tuition expenses» was up to 41% at MSEIs and 60% at HEIs.

It is important here to say more about the roles of state and non-state institutions in growth of paid education services. Non-state HEIs emerged almost simultaneously with the introduction of paid places at state HEIs, and they immediately occupied a sizeable part of this new market: in 1993, non-state HEIs accounted for roughly 50% of admissions to paid places. But there was a quick reaction in the opposite direction as state HEIs began major expansion of paid places, leaving the non-state HEIs behind. By 1998, the share of non-state HEIs in admission to paid places had dropped to 22% and it stabilized at this level.

Non-state MSEIs only appeared in 1995 when state MSEIs were already admitting students *en masse* to paid places. Admissions to paid places at non-state MSEIs have grown quite fast: non-state MSEIs accounted for 11% of total admission to paid places by 2002 and, to all appearances, there is room for further growth. But the role of the non-state sector looks set to remain modest in MSEIs as in HEIs. State establishments continue to occupy dominant positions in tertiary education, including its paid segment.

State-imposed limits on the number of budget-financed places in tertiary education and the ability of both state and private MSEIs and HEIs to increase admission to paid places have led to essential shifts in the structure of education supply. In particular, higher educational institutions have extensively (and, in our opinion, excessively) increased paid enrolment in part-time departments in response to rising demand for part-time courses from female students.

These shifts are more clearly reflected in the structure of supply by fields of education. As can be seen from the data presented in Figure 5.2, not only the number but also the disciplinary structure of budget-financed places has changed little during the past decade. So almost all of the growth in demand for tertiary education and practically all changes in its structure have been met by admission to places «with full compensation of expenses». This mainly concerns demand for what we are calling «social fields», which has grown the fastest, but also to rapidly growing demand for some popular disciplines of «natural fields».

The education system as a whole reacted quickly to the strong growth in demand for tertiary education and changes in structure of that demand

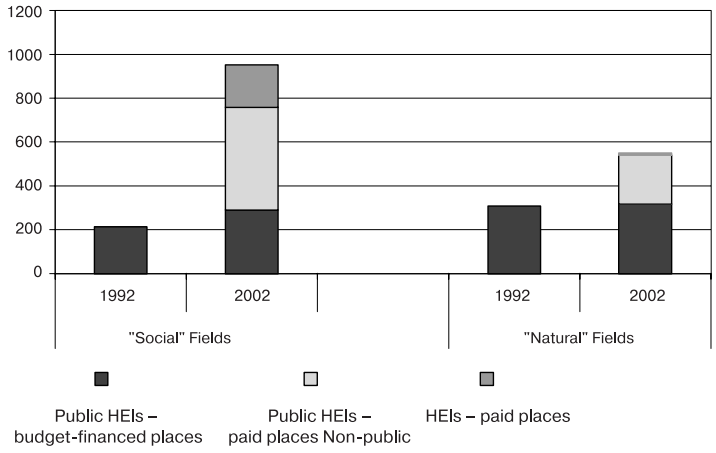
Two points here are particularly noteworthy. First, it is obvious that both state HEIs and officials of the Ministry of Education have an interest in keeping the number and structure of budget-financed student places constant. In the case of Ministry officials the motive is no more sinister (we hope) than saving themselves extra work. But HEIs have clear financial motives: preservation of inadequate number and structure of budget-financed places creates more paying demand for socially required fields of education.

Second, the poor competitiveness of non-state HEIs is quite obvious: they receive the left-overs of total demand for education, and therefore tend to offer social sciences, in which state HEIs cannot meet demand. Non-state HEIs tend to lack sufficient financial, staff, and equipment resources to offer even a minimal standard of training in natural science and technology specialties.

State establishments continue to occupy dominant positions in tertiary education, including its paid segment

In some segments of the market (most notably in economics and management, and law, and generally in the sphere of part-time education) both state and non-state educational institutions are simply pandering to demand from a very undiscerning group of consumers. In other segments they are forcing a definite structure of paid sup-

Figure 5.2. **New Entrants to Higher Educational Institutions by Fields of Education and Types of Financing, 1992 and 2002, thousands of people**



ply on consumers. In state HEIs this structure is supported by, among other things, preservation of the make-up of budget-financed places by fields of education (which has remained almost unchanged since Soviet times) and, accordingly, preservation of organizational subdivisions (departments, chairs) and types of teaching staff.

HEIs keep superfluous faculty staff, so that, in tertiary education of type 5A, Russia has a very low ratio of students to teachers (cf. cf. Annex to Chapter 5 (A-5.2) Table 2). Surplus staff and low salaries are an obstacle to inflow of young teachers to HEIs and, in the long run, lead to ageing of the teaching staff. Thus, by 2002 the share of teachers over retirement age (60 years) had reached 22%. Disproportions of tertiary education in Russia compared with general world standards are also clear from breakdown of teaching staff by sex, particularly in tertiary education of type 5B (cf. Appendix 5.2, Table P5.2.2). About half of HEI teachers are women, but the share of women among teaching staff at MSEIs is 75%.

HEIs have clear financial motives: preservation of inadequate number and structure of budget-financed places creates more paying demand for socially required fields of education

However, the main problem of tertiary education in Russia is low financing. According to available estimates, total tertiary education expenditure (public and private) in Russia is equal to 1.1% of GDP. But adequacy or inadequacy of financing is, of course, not only a matter of total expenditure: it also depends on the demographic structure (the size of the population of «learning age») and the degree of educational coverage of the population (these factors have been discussed above). The indicator, which takes account of these factors, is the ratio of expenditure per student, by education levels, to average per capita GDP (cf. Table 5.4).

Less affluent countries usually maintain their tertiary education expenditure per tertiary type 5B student at much higher levels than affluent countries: around 50% of GDP per capita, and between 100% and 150% of GDP per capita per tertiary type 5A student. This enables such countries to reduce, if only partially, the gap in absolute financing amounts between them and richer countries and to compensate for quality differences. But in Russia, this indicator is even lower than in the richest countries, with all the consequences that follow from that.

The low level of per capita financing in tertiary education is the reverse side of its mass character. The scale of tertiary education in Russia is even bigger than in the world's richest countries, but absolute spending on tertiary education is lower than in most countries with roughly the same income level, and Russia's per capita financing of tertiary education is among the lowest in the world. The consequence is decline in the quality of tertiary education and its ability to meets modern needs.

One sign of inadequate standards in recent years is a rapid increase in the number of people enrolling in tertiary education who already have professional education. The share of people with professional education (types 4C or 5B) among new admissions to state MSEIs rose from 5% in 1992 to 10% in 2001, and the share of new entrants to HEIs who already had professional education (types 4C, 5B or 5A) from 20% to 36%. So, although tertiary education (including MSEI level) ought to imply direct access to the labor market, *de facto* many graduates need to pursue or retake their studies.

Tertiary Education and the Labor Market

Russia's labor market is quite efficient in many respects and matches basic parameters of a market economy.[4] This can be seen, in particular, in features of labor demand and supply depending on the level

of education. As one would expect, people with higher levels of education are more economically active (more disposed to offer their labor), and this indicator is at its highest level among people with higher education (cf. Figure 5.3). Features of demand for labor are also typical: people with higher levels of education are more in demand. As a result, the unemployment indicator shows a stable inverse relationship to education levels, and is at its lowest among people with higher education.

The data in Figure 5.3 refer to ages 15–72, and this leads to a certain understatement in the indicators for economic activity and employment rates among people with primary education and lower secondary education, since most of these people are concentrated in the junior (15–19 years) and senior (65-72 years) age groups. But this does not affect general regularities, which, on the whole, have not changed over the last decade.

However, starting from the mid-1990s there was a rapid increase in the number of people graduating from MSEIs, HEIs and higher levels. Between 1995 and 2002, the number of MSEI graduates went up by 41% and the number of graduates with a bachelor's degree and equivalent rose by 101%; between 1995 and 2000, the number of persons receiving masters, candidate of science and doctoral degrees rose by 123% (cf. Figure5.4). The question arises: how does the labor market react and adjust to the increased inflow of people with tertiary education?

Unemployment indicators have shown no clear reaction at all. Between October 1998 and November 2003, the overall unemployment rate fell by 5.3 percentage points (from 13.2% to 7.9%). The rate of unemployment among people with special tertiary (MSEI) education dropped by 5.2 percentage points (from 11.4% to 6.2%), and there was a fall of 3 percentage points (from 7% to 4%) among people with professional tertiary (HEI) education. So increase in the number of people graduating with tertiary education has not led to any growth in unemployment in the corresponding education groups as yet. These graduates have been fully absorbed by the market.

It should be pointed out that increase in the number of MSEI and HEI graduates is not a direct indicator of growth in supply of people with these levels of education among the total economically active population. In particular, the share of people with special tertiary education is very high among senior age groups of the working-age population, which are gradually quitting the labor market, so that overall supply of people with special tertiary education is diminishing. According to data from the labour surveys,

Table 5.4.

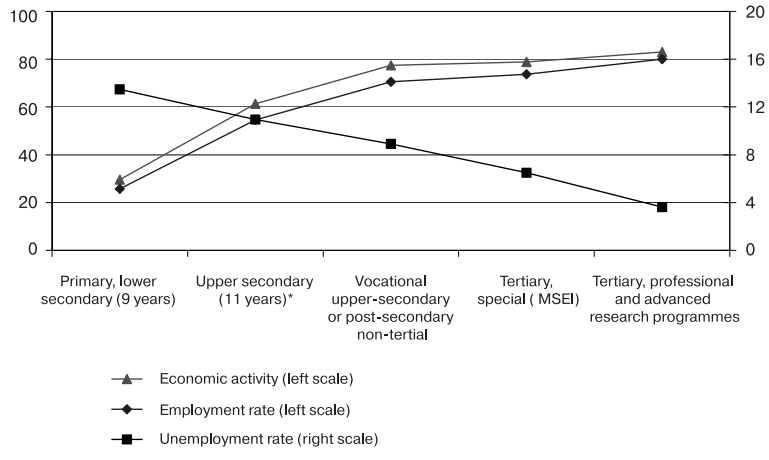
Gross Tertiary Education Expenditure in G8 Countries (1999)

Countries	GDP per capita, thousands of dollars*	Tertiary education expenditure as % of GDP**	Expenditure per one student as % of GDP per capita***		
			Total, tertiary education	Level 5B	Levels 5A-6
USA	33,725	2.3	57	—	—
Canada	26,443	2.5	57	—	—
Japan	24,968	1.0	41	31	43
Germany	24,601	1.1	42	22	46
France	23,068	1.1	34	37	33
Italy	23,937	0.8	32	30	32
Great Britain	23,312	1.1	41	—	—
Russia	6,067	1.1	27	13	35

* At purchasing power parity. ** In national currencies. *** In national currencies; expenditure per one student (in terms of full-time tuition).

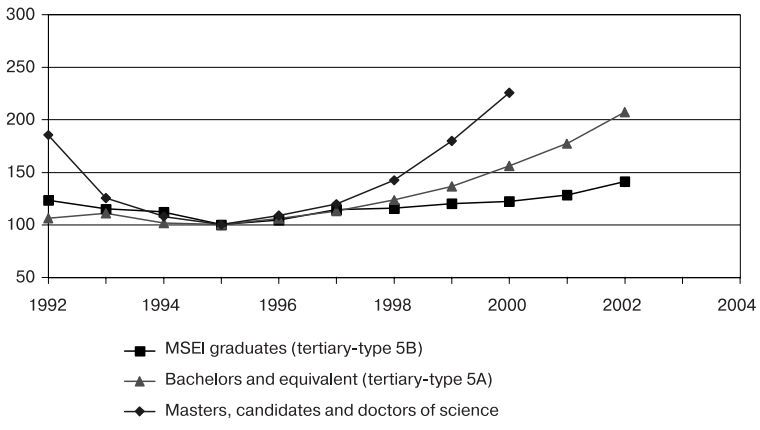
Source: OECD; Federal Service for State Statistic..

Figure 5.3. **Characteristics of Demand and Supply in the Labor Market by Levels of Education, 2002, in % (yearly average based on the results of four labor force surveys)**



* Including incomplete higher education

Figure 5.4. **Tertiary Education Graduates, 1995 = 100**



the total number of people employed in the economy grew by about 14% (from 58.4 to 66.5 million) from end-1998 to end-2003. During the same period the number of people with professional tertiary (type 5A) education who were gainfully employed rose by 28%, and numbers of working people special tertiary (type 5B) education dropped by 9%. As a result, the share of employees with professional tertiary (type 5A) education rose from 20.7% to 23.2%, while the share with special tertiary (type 5B) education fell from 33.5% to 26.8%.

The number of employees with professional tertiary (type 5A) education grew particularly quickly in market services: trade and public catering (+59%), municipal and housing services (+49%), and finance, credit, insurance, pension provision (+45%). These are the most rapidly developing sectors of the Russian economy, so the influx of higher education graduates is logical and legitimate. Growth in numbers of employees with higher education was lowest in the goods-producing sectors (industry, agriculture and forestry).

Increased supply of qualified labor has changed the sectoral structure of demand for people with tertiary education (particularly of type 5A), but it has also reduced differences in remuneration of labor, i.e. salary advantages due to higher levels of education. Our estimates presented in Figure 5.5 suggest that employees with special and professional tertiary education still enjoy a wage premium, but its size compared with incomes of employees with general upper secondary education has diminished. It is also worth noting a definite depreciation in the labor value of people with lower secondary education or vocational upper secondary education. This is likely to cause further reduction in demand for vocational upper secondary education and to increase demand for general upper secondary education.

On the whole, however, market signals continue to stimulate demand for tertiary education, despite some reduction of the income premium for tertiary qualifications. People with tertiary education are both more in demand and better paid.

The status of Russia's educational institutions has to conform to the level of education, which they in fact provide, and the sooner this happens, the better

* * *

The above analysis shows that discrepancy between the scale of tertiary education in Russia and the level of the country's economic development is mainly predicated on flaws in the education system rather than inefficiency of the labor market. In many respects, formal measures of the spread of tertiary education in Russia are simply at variance with the real state of affairs. Most MSEIs, even if they have been nominally transformed into colleges, effectively offer vocational upper secondary or post-secondary non-tertiary education. This is also true of many HEIs: although they are now called academies and universities, they are, in fact, at best quite rudimentary colleges (the Soviet term would be «tekhnikum»).

Sooner or later formal education indicators will have to be put in line with reality, chiefly by means of independent public professional certification, and possibly with help from international experts. The status of Russia's educational institutions has to conform to the level of education, which they in fact provide, and the sooner this happens, the better. Otherwise, the education system will continue to send distorted signals to the labor market, leading to general devaluation of tertiary education and undermining efficient use of the labor force.

There are a number of other fairly evident priorities, some of which follow from Russia's adhesion to the Bologna Convention on Education. First, transition to a two-stage structure in the higher education system (bachelor's program and master's program) should be speeded up,

creating a fully fledged three-stage tertiary education system with post-graduate studies as the third stage. At present, under the Law on Education of 1992, a bachelor's degree is treated as a first-level higher education, while qualification as a «specialist» counts as second-level higher education (equivalent to a master's program), although there is little difference in the level of expertise, which the two qualifications confer. As a result there are 10 times more people with second-level higher education (specialists) than with first-level (bachelors), although the former have not been through the first level.

The system for classification of fields and levels of education needs to be optimized. The principals of ISCED-97 should be introduced as soon as possible in order to help bring Russia into the general European system of education and to enhance the efficiency of the education system inside Russia.

The traditional Russian classification of disciplines is slowing down modernization of education. Clearly, educational institutions themselves, with their long-established structure of departments, chairs, curricula, etc., want to maintain this classification. But changing the classification is not just a technical step: it is a basic prerequisite for development of the education system and, if fulfilled, it will entail substantial changes in the entire system of tertiary education.

Narrow specialization, which is forced on entrants to special tertiary (type5B) and, particularly, entrants to professional tertiary (type 5A) education institutions, should be abandoned. Such narrow specialization, fixed at the moment of and almost impossible to change during the course, makes the tertiary education system rigid and inflexible and may lead to employment problems for MSEI and HEI graduates in the near future.

Changes in demand for educational services inevitably lag changes in the structure of demand on the labor market. But the lag can be reduced to no more than two years, instead of five at present, if most HEI students follow four-year bachelor programs and choose a narrow specialization no earlier than their third year of study.

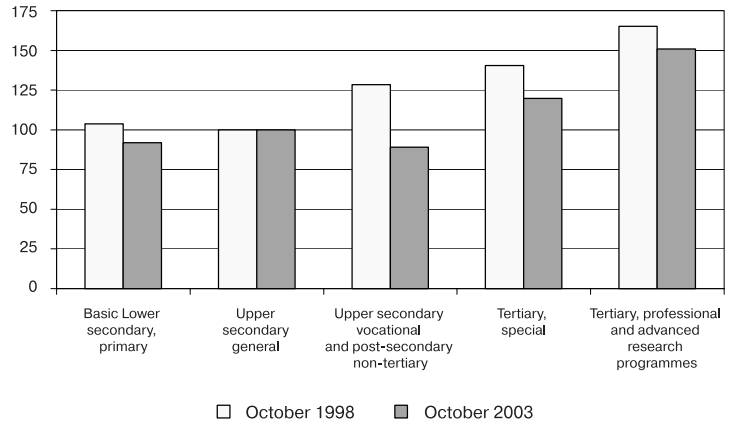
The quality of education provided by MSEIs and, most of all, by correspondence and external programs of both state and non-state HEIs, gives serious cause for concern. There are also signs of decline in the quality of education at full-time programs, but this seems due to increasing willingness of students to combine work and study, to the detriment of the latter.

There is now a practically unlimited supply of low-quality educational services in some fields (particularly in «economics and management» group). This, coupled with excessive development of correspondence courses and other similar forms of tuition, and with lowering of the demands made on full-time students (who often have to combine studies with work) is completely distorting the educational services market.

This, in its turn, leads to deformations in the labor market, devalues tertiary education and diminishes its returns. A diploma or state certificate attesting completion of higher education has ceased to be a guarantee of expertise. Employers face the choice of lowering the standards, which they expect from young applicants (who will consequently be paid less), or spending extra money to obtain an assessment of the quality of diplomas.

Our analysis also points to the need for substantial improvement in the quality of special tertiary (type 5B) education. In particular, more and more MSEI graduates are going on to professional tertiary (type 5A) education institutions, because their MSEI training is inadequate for finding a

Figure 5.5. **Average Monthly Wages by Levels of Education (income of people with general upper secondary education = 100)**



Source: Surveys by VTsIOM (All-Russian Public Opinion Research Center) (November 1998, N=1083), VTsIOM-A (November 2003, N=932); calculated by D. Ibragimova.

The system for classification of fields and levels of education needs to be optimized. ... The traditional Russian classification of disciplines is slowing down modernization of education

Such narrow specialization, fixed at the moment of and almost impossible to change during the course, makes the tertiary education system rigid and inflexible and may lead to employment problems for MSEI and HEI graduates in the near future

job (deferment of military service by entering an HEI is admittedly also a factor here, but it does not fully explain the phenomenon). Special tertiary (type 5B) education is starting to turn into a preliminary stage of professional tertiary (type 5A) education, instead of functioning as a parallel structure. Special tertiary (type 5B) and professional tertiary (type 5A) education should not be treated as successive stages, but as parts of a unified system of tertiary education.

[1] Constructing Knowledge Societies: New Challenges for Tertiary Education. Washington, DC: The World Bank, 2002, p. vii.

[2] Cf.: A.V. Poletayev, M.L. Agranovich, L.N. Zharova.. Education Indicators in the Russian Federation: An International Comparison, 2002. M. Aspect Press, 2003 (in Russian).

[3] On long-term trends in the demand for tertiary education and supply of educational services cf.: Poletayev A., Savelieva I. Trends in Professional Education in Russia. Part 1: Objects of Supply and Demand // Russian Economic Trends, (London), 2001, vol. 10, No 3/4, pp. 45-59. Part 2: Subjects of Demand // Russian Economic Trends (London), 2002, vol. 11, No 2, pp. 37-47.

[4] Cf.:. Russian Employment Outlook. Issue I (1991-2000) / Ed. T.M. Maleva. M.; TEIS, 2002 (in Russian).

The level and quality of a country's education system are among main criteria of that country's economic development. One measure of society's attitude to education is public spending on education as a share of Gross Domestic Product. This proportion is very low in Russia compared with developed countries at a mere 3.6% (compared with 4.8% in the USA , 5.8% in France, 4.6% in Italy, 4.5% in Germany, and 5.4% in Canada). State spending on educational establishments is complemented by private payments.

However, Russia has remained a very education-oriented country, despite deterioration of its economy and living standards. The country's education system has not collapsed in the transition period, and most of the crisis phenomena in education during the first half of the 1990s had been overcome by the end of the decade. Student numbers have been growing steadily since 1996–1997: there were 900,000 admissions to medium special educational institutions (MSEIs) and 1,600,000 admissions to higher education institutions (HEIs) in 2003. These figures are unprecedented in Russian history. Educational services have become quite a profitable business over the last decade, with significant investment and turnover. Non-state HEIs have appeared and developed, and now account for 14% of students. There are now 60 non-state HEIs in Russia per 100 state HEIs.

MSEIs and HEIs have changed their specialization pattern to a large extent over the last 10 years and expanded the range of services, which they offer. As early as 1995, the number of graduates in engineering, technology and agriculture had dropped significantly and the number specializing in economics, management and the humanities had risen.

For many years numbers of young people wanting to study at HEIs, MSEIs and colleges have exceeded capacity of these institutions. On average in 1995-2003 there have been 1.5 and 1.8–1.9 claimants per student place at MSEIs and HEIs, respectively. Lowest competition for entry to MSEIs in 2002 and 2003 was for natural science subjects such as agriculture and fisheries (1.2-1.3 claimants per place), and the greatest competition was for IT and mining (1.7-1.8 claimants per place). Lowest competition for entry to HEIs was in education, economics and management, transport, aerospace and rocket technology, naval engineering, and interdisciplinary subjects (1.7 claimants per place), while the biggest competition was in geodesy and cartography (2.9 claimants per place), and chemical technology (2.5).

There are now more opportunities for Russian students to study abroad on university or equivalent programs. Already by 1995 as many as 10,100 Russian were studying abroad (by comparison 36,600 Greeks, 61,400 South Koreans, 56,700 Japanese and 12,100 Mexicans went to studied outside their native countries at that time). Russian students went mainly to the USA (4,800) and Germany (2,700).

Conversely, Russia remains attractive for students from abroad, particularly from CIS countries (former Soviet republics), Asia and Africa. In 2002, there were over 60,000 students from non-CIS countries studying at Russian HEIs, including 33,400 from Asian countries, 5,500 from Europe, 4,200 from the Baltic countries, and 2,500 from the USA and Canada. The total number of CIS students at state HEIs in Russia was 32,900 people, including 23,800 full-time students. Nearly half of all CIS students came from Kazakhstan, every seventh was from Ukraine, and every twelfth from Belarus.

The UNO has been publishing annual calculations of the Human Development Index (HDI) annually since 1990, and it is worth looking in detail at impact of education levels on Index readings. Indicators included in the HDI are life expectancy, living standards (as GDP per capita in US$ purchasing power parity, or PPP US$), and education (as a combination of the adult literacy rate and the ratio of those in education to those of the relevant age group). The HDI for 2001 put Russia in one of the lowest positions in Europe, with only Romania, Bosnia and Herzegovina, Albania, Moldavia and Ukraine faring worse. Russia's poor showing was mainly due to low life expectancy and a low GDP per capita, while its education score was relatively high.

International standards for education are currently determined in accordance with the International Standard Classification of Education (ISCED 1997), where the lowest level reflects compulsory primary education, the second level reflects general secondary and vocational education, and the third reflects higher and post-graduate education. UNESCO estimates in 2001 put adult illiteracy in Russia below 5%, compared with 15% in Turkey, 14% in China, 14% in South Africa, 15% in Chile, 9% in Mexico, 13% in Brazil, and 42% in India. The education component of HDI calculations is higher for the US than for Russia, but the ratio of those in primary education to total number of people of the relevant age is higher in Russia (109%) than in the US (101%). The US is ahead of Russia at the secondary and tertiary levels (95% and 73% of the relevant age groups in the USA compared with 83% and 64% in Russia).

It is interesting that the education component of the HDI for 2001 put Portugal above Russia, although 7% of Portuguese residents aged 15 and over were illiterate, and students in tertiary education made up 50% of the relevant age group. In Hungary and Italy, as in Russia, illiteracy was less than 5%, and the education index was the same as for Russia. In Italy, the relevant age group share of those in tertiary education was 50% (in the 2000-2001 academic year), and in Hungary it was 40% (also in 2000-2001). Belgium, Denmark and the Netherlands scored highest on the education index (0.99), with 58%, 59% and 55% of people of the relevant age group in tertiary education.

Comparison of these indicators emphasizes the need to improve methods for determining the education index in calculating HDI, possibly taking account of education abroad and quality of education. According to the calculations by UNDP specialists, the education index for Bulgaria, Uzbekistan, and Kirghizia is 0.91, and Luxembourg and Tajikistan both have results at 0.90, although it is fairly evident that access to educational services is very different in these countries.

The relationship between education level and material well-being is clear in Russia: higher levels of education are associated with higher incomes. Thus, over half of household members in the 20% of Russian households with high income have higher education. In Moscow and St. Petersburg the share of people with higher education is almost double that in other towns and urban settlements in Russia, and this applies to all income groups among surveyed households. The share of people with higher education among heads of government and administrative bodies, institutions, organizations, companies and structural subdivisions of companies is 62%, and 76% in Moscow and St. Petersburg. The share of employers with higher education is higher at 35% than the share of employees, self-employed and members of producers' cooperatives. In Moscow and St. Petersburg 55% of employers have higher education.

A survey of household budgets shows that members of well-to-do households are keener on obtaining higher education: the poorest 20% of households that include students account for only 11.4% of total students at HEIs, while the richest and second-richest quintiles account for 26–27% each. However, this inequality is not as glaring as inequality in actual incomes: the poorest 20% receive only 6.3% of total personal incomes, while the richest 20% receive 43.6%. Only 32% of people aged 17–21 in poorest households are HEI students, while 86% of people in this age group in richest households are HEI students.

Russian society is clearly aware of the need for education, understanding the link between education level and a person's social and employment status. This is corroborated by results of quarterly consumer surveys conducted by the Federal Service of the State Statistics since the end of 1998. These surveys of 5000 people show strong desire for education: about 30% want tertiary education but cannot obtain it, mainly due to lack of money. And education tops the list of reasons for saving money: 33–36% name education as one of the main uses of savings.

The results of the 2002 National Census of the Population provide a comprehensive picture of education levels in Russia.

Table 1.

Education Level in Russia

	Millions of people			2002 as % of 1989	Per 1000 people		
	1979	1989	2002		1979	1989	2002
Total number aged 15 and over, of which having:	107.7	113.0	121.3	107.3	1,000	1,000	1,000
professional education							
higher (including post-graduate)	8.3	12.7	19.4	152.1	77	113	160
incomplete higher	1.8	1.9	3.7	194.3	17	17	31
medium special	13.6	21.7	32.9	151.7	127	192	272
lower special	...[1)]	14.7	15.4	104.6	...	130	127
general education							
complete secondary (11 years)	22.0	20.3	21.3	105.0	204	179	175
basic secondary (9 years)	29.3	19.8	16.7	84.3	272	175	137
primary	19.9	14.6	9.3	64.1	185	129	77

[1)] Data on graduates from vocational-training schools have never been compiled, and such graduates are included in the complete secondary or basic secondary groups as appropriate.

Table 2.

Literacy in the 9-49 Age Group

Years	Literacy, %
1897	29.6
1926	60.9
1939	89.7
1959	98.5
1970	99.7
1979	99.8
1989	99.8
2002[1)]	99.8

[1)] Population in the 10-49 age group.

In accordance with UN and UNESCO recommendations, people were considered literate in the 2002 census if they could read and write; during earlier censuses, the literacy criterion was reading only.
In 2002, the share of the illiterate population, aged 10 and over, was 0.5%, against 1.9% in 1989. The bulk of the illiterate population (67%) were aged over 60.

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Chapter 6.
Human Development and Intellectual Potential of Russia's Regions

Creation of a knowledge-based society in a country like Russia is unthinkable without strong regions and effective, coordinated regional policy. The key task of that policy must be to consolidate society and the state by evening out disproportions between socio-economic development of different regions. The social sphere is mainly the responsibility of regional administrations, which can do much to meet the challenges through implementation of regional programs.

Improvement in the social sphere is mainly a way of expanding people's choice, which is always a key criterion of progress. But the social sphere has special importance in Russia today. There are two reasons for this.

The first reason is associated with the globalization processes, into which Russia as a whole and each region of the country are increasingly being drawn. Russia today lacks financial resources comparable with those of economically developed countries, and its possession and independent development of new technologies are limited to a few spheres. Therefore, Russia's prospects of joining countries with biggest competitive advantages and thus ensuring high and steady rates of economic growth depend in many respects on accumulation and use of human capital.

The special role of the social sphere in economic development is not exclusive to Russia. The recommendations of the Post-Washington Consensus are based on the idea that sustainable growth, particularly in emerging markets, cannot rely only on macroeconomic stabilization (reducing the role of the state, trade liberalization, and checks on inflation). There is wider range of tasks to be addressed. Key priorities are spread of knowledge and increase in the level of education, accumulation of human capital, the struggle against unemployment and poverty, development of the public health system, environmental protection, and greater role of people in elaboration and realization of economic strategy.

The second reason why the social sphere is so important for development of Russia today is the crisis of confidence in the state, caused by considerable social cost of economic reforms and the problems, which those reforms have brought: growth of poverty and income inequality, the scale and character of unemployment (disastrous in some regions), reduction of access to social services (education, health protection and social security) and of the quality of these services, loss of savings and growth of criminality. A far from complete list of negative social consequences includes growth of mortality, fall of the birth-rate, appearance of a «poverty mentality» and greater dependence on various types of material support, non-adaptation, and socio-economic passivity (including refusal to invest personal savings in the national economy). In view of this, human development is more than a desirable outcome in the social sphere – it is a critical condition for Russia's economic development.

Improvement in the social sphere is mainly a way of expanding people's choice, which is always a key criterion of progress. But the social sphere has special importance in Russia today

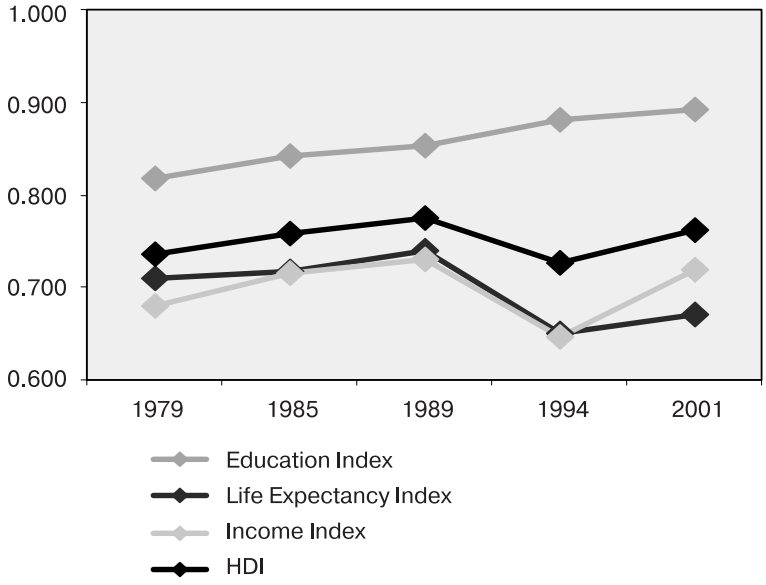
The Human Development Index in Russia's Regions, 1979-2001

In order to understand the principals and assess the prospects for human development in Russia, it is important to analyze dynamics of its Human Development Index over the last 20-25 years.[1] We will look at Russia's HDI and its components for 1979, 1985, 1989, 1994 and 2001, which suggest a division into three periods:

- 1979–1989, when HDI and all its components grew comparatively steadily;
- 1989–1994, when life expectancy, material well-being and the overall HDI fell, and only education rose;
- 1994–2001, when further growth of education and significant rise in the material well-being put the HDI back on an upward trend (Diagram 6.1).

There were substantial changes in the relationship between regional HDIs in the periods under consideration: regional differentiation shrank in 1979–1985, increased in 1989–1994, and began to shrink again from

Diagram 6.1. **Dynamics of HDI Components in Russia, 1979-2001**



the end of the 1990s (except for clear leaders and outsiders, Diagram 6.2). Changes in HDI regional differentiation were due to uneven adaptation of regions to market conditions, which also led to some mobility of regions between the three groups of «leaders», «middle-rankers» and «outsiders».

HDI tendencies in the overwhelming majority of Russian regions during 1979–2001 were ever-slower increase in 1979–1989, a slump in 1989-1994 and a recovery towards 2001 (Table 6.1 and Table 6.2). In 12 regions – Bryansk, Voronezh, Astrakhan, Penza, Kemerovo, Novosibirsk, Tomsk, Chita, the Republic of Daghestan, Kalmykia, Marii El and Tyva – the HDI decline began as early as 1985. The main determinants of these dynamics were changes in material well-being and life expectancy, while education rose steadily.

In 2001 the HDI exceeded its 1989 level in only six regions: Belgorod Region, Moscow City, the Republic of Kalmykia, the Republic of Marii El, Republic of Tatarstan, and Tomsk Region. The HDI in 57 regions was below its level in 1985, and in 19 regions it was even lower than in 1979. In three Russian regions – Ivanovo, Tver and Ulyanovsk – the 2001 Index was below its level in 1994, which was a particularly difficult year for Russia.

Composition of the top-10 regions underwent considerable changes in 1979-2001 (Table 6.3). The main trend was strengthening in positions of the Volga and Central regions. Leading HDI positions were taken by regions, which managed to reinforce high levels of education with high levels of material well-being. These are the country's financial and industrial centers (Moscow City, St. Petersburg and Samara Region), centers of oil production and refining (Tyumen Region, Republic of Tatarstan, Tomsk Region, of Bashkortostan and Komi Republic), and also regions with a large metallurgy export potential (Republic of Sakha (Yakutia), Lipetsk Region and Krasnoyarsk Territory).

The impact of education on HDI leadership rose in 1979-1989 (the average education ranking of regions in the HDI top-10 rose from 17 to 12, and 5 of the best regions for education were in the overall top-10), and also in 1994–2001 (when the average education ranking of regions in the top-10 rose from 25 to 18, and leading regions in education were 4 of the top-10). Growing importance of material well-being in 1985-1994 (the average ranking by well-being of top-10 regions rose from 16 to 8, and 8 of the most prosperous regions were in the top-10) continued in 1994–2001 (when average ranking of top-10 regions by well-being reached 7 and the top-10 included, as before, 8 prosperity leaders).

The outsider regions in the years under review were fairly constant. The «Last-5»

Diagram 6.2. **Dynamics and Differentiation of HDIs for Russian Regions in 1979-2001[2]**

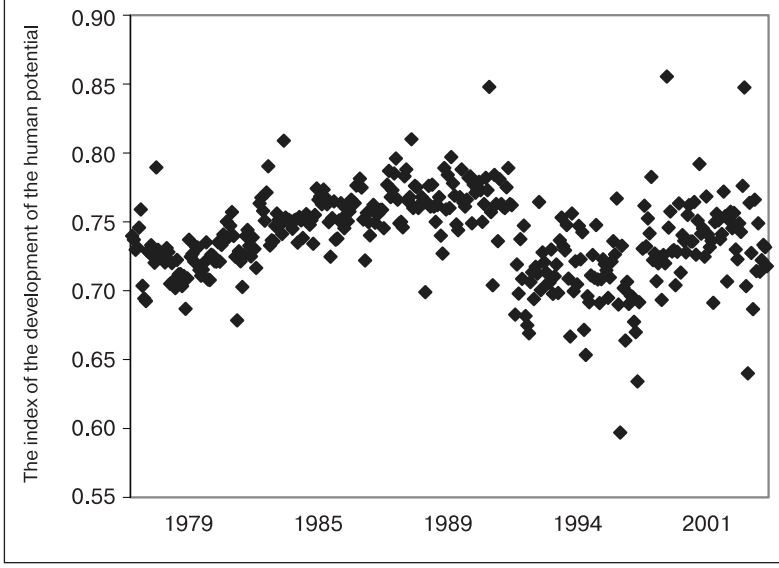


Table 6.1.

The Human Development Index for Russian Regions in 2001

Regions	GRP* per capita, PPP in US dollars	Income Index	Life expectancy at birth, both sexes, years	Life Expectancy Index	Adult Literacy, % in 2002	Enrolment in Education,%	Education Index	HDI	Russian ranking
1	2	3	4	5	6	7	8	9	10
Russia	***7438***	***0.719***	***65.29***	***0.672***	***99.0***	***69.8***	***0.893***	***0.761***	
Moscow City	17454	0.862	67.40	0.707	99.7	100.8	0.998	0.855	1
Tyumen Region	30470	0.955	66.73	0.696	99.2	69.3	0.892	0.847	2
Republic of Tatarstan	9812	0.765	67.63	0.711	99.0	72.0	0.900	0.792	3
St. Petersburg City	7015	0.709	66.19	0.687	99.8	85.9	0.952	0.783	4
Tomsk Region	8246	0.736	65.49	0.675	98.9	77.2	0.917	0.776	5
Republic of Bashkortostan	7819	0.728	66.68	0.695	98.8	70.5	0.894	0.7726	
Samara Region	8551	0.742	64.73	0.662	99.2	71.7	0.900	0.768	7
Republic o Sakha (Yakutia)	9017	0.751	64.37	0.656	99.0	69.2	0.891	0.766	8
Lipetsk Region	7605	0.723	66.53	0.692	98.4	66.6	0.878	0.764	9
Krasnoyarsk Territory	10278	0.773	63.34	0.639	99.0	65.8	0.879	0.764	10
Yaroslavl Region	7740	0.726	64.22	0.654	99.2	74.7	0.910	0.763	11
Belgorod Region	6153	0.688	67.38	0.706	98.6	70.5	0.892	0.762	12
Komi Republic	8913	0.749	64.79	0.663	99.2	63.3	0.872	0.762	13
Orel Region	6298	0.691	65.37	0.673	98.9	74.6	0.908	0.757	14
Perm Region	8732	0.746	63.85	0.648	98.9	65.7	0.878	0.757	15
Chelyabinsk Region	6897	0.707	65.08	0.668	99.1	70.1	0.894	0.756	16
Republic of North Ossetia - Alania	4055	0.618	69.43	0.741	99.1	74.5	0.909	0.756	17
Nizhny Novgorod Region	7290	0.716	64.92	0.665	98.9	67.4	0.884	0.755	18
Udmurt Republic	6812	0.705	65.26	0.671	99.0	68.1	0.887	0.754	19
Vologda Region	7769	0.726	64.37	0.656	98.8	64.8	0.875	0.752	20
Orenburg Region	6540	0.698	65.21	0.670	98.9	68.0	0.886	0.751	21
Krasnodar Territory	5898	0.680	67.00	0.700	99.0	63.7	0.872	0.751	22
Republic of Kalmykia	6314	0.692	66.32	0.689	98.2	65.2	0.872	0.751	23
Republic of Kabardino-Balkaria	4843	0.648	67.96	0.716	98.8	68.1	0.886	0.750	24
Novosibirsk Region	5079	0.656	66.26	0.688	98.8	73.5	0.904	0.749	25
Khabarovsk Territory	6847	0.705	63.02	0.634	99.5	73.3	0.908	0.749	26

Table 6.1. (continued)

Regions	GRP* per capita, PPP in US dollars	Income Index	Life expectancy at birth, both sexes, years	Life Expectancy Index	Adult Literacy, % in 2002	Enrolment in Education, %	Education Index	HDI	Russian ranking
1	2	3	4	5	6	7	8	9	10
Moscow Region	5288	0.662	64.77	0.663	99.6	74.5	0.912	0.746	27
Sverdlovsk Region	6266	0.691	64.72	0.662	99.2	66.6	0.883	0.745	28
Volgograd Region	5468	0.668	65.88	0.681	98.9	68.0	0.886	0.745	29
Omsk Region	4950	0.651	66.65	0.694	98.7	67.4	0.883	0.743	30
Murmansk Region	5526	0.670	65.87	0.681	99.6	63.1	0.874	0.742	31
Astrakhan Region	5572	0.671	65.18	0.670	98.6	67.8	0.883	0.741	32
Rostov Region	4581	0.638	66.23	0.687	99.1	71.1	0.898	0.741	33
Saratov Region	4975	0.652	65.42	0.674	99.2	70.6	0.897	0.741	34
Republic of Mordovia	4289	0.627	67.38	0.706	97.9	70.5	0.888	0.740	35
Stavropol Territory	3922	0.612	67.75	0.713	98.6	69.0	0.887	0.737	36
Chuvash Republic	4173	0.623	66.36	0.689	99.0	70.9	0.896	0.736	37
Republic of Daghestan	2616	0.545	71.56	0.776	98.4	69.5	0.888	0.736	38
Voronezh Region	4166	0.622	66.17	0.686	98.3	73.0	0.899	0.736	39
Kursk Region	4542	0.637	65.87	0.681	98.5	69.7	0.889	0.736	40
Magadan Region	5867	0.680	65.06	0.668	99.6	56.5	0.852	0.733	41
Arkhangel Region	5791	0.677	63.87	0.648	99.2	63.0	0.871	0.732	42
Sakhalin Region	6629	0.700	62.73	0.629	99.4	60.9	0.866	0.732	43
Ulyanovsk Region	4470	0.634	65.99	0.683	98.6	65.9	0.877	0.731	44
Republic of Karelia	5912	0.681	62.96	0.633	99.2	65.0	0.878	0.731	45
Altai Territory	4350	0.630	66.30	0.688	98.2	65.2	0.872	0.730	46
Smolensk Region	5554	0.670	62.70	0.628	98.9	69.0	0.889	0.729	47
Ryazan Region	5806	0.678	64.71	0.662	98.7	56.4	0.846	0.729	48
Tula Region	5872	0.680	63.00	0.633	99.1	63.4	0.872	0.728	49
Kirov Region	4316	0.628	65.88	0.681	98.4	65.4	0.874	0.728	50
Irkutsk Region	6122	0.687	61.82	0.614	99.1	66.3	0.882	0.727	51
Novgorod Region	5885	0.680	62.32	0.622	98.9	65.9	0.879	0.727	52
Tambov Region	4806	0.646	65.93	0.682	98.1	58.9	0.850	0.726	53
Republic of Karachaevo-Cherkesia	3065	0.571	69.38	0.740	98.4	63.4	0.867	0.726	54
Kaluga Region	4873	0.649	64.27	0.655	99.2	64.0	0.875	0.726	55

Table 6.1. (continued)

Regions	GRP* per capita, PPP in US dollars	Income Index	Life expectancy at birth, both sexes, years	Life Expectancy Index	Adult Literacy, % in 2002	Enrolment in Education,%	Education Index	HDI	Russian ranking
1	2	3	4	5	6	7	8	9	10
Penza Region	3696	0.603	66.54	0.692	98.4	67.0	0.879	0.725	56
Vladimir Region	4959	0.652	63.56	0.643	99.4	64.9	0.879	0.724	57
Republic of Adygeiya	2854	0.559	68.77	0.730	98.7	67.4	0.883	0.724	58
Kemerovo Region	5300	0.663	62.77	0.630	98.9	65.1	0.876	0.723	59
Republic of Khakasia	4775	0.645	63.57	0.643	98.8	66.6	0.881	0.723	60
Leningrad Region	6914	0.707	61.99	0.617	99.5	53.9	0.843	0.722	61
Kamchatka Region	4469	0.634	63.79	0.647	99.7	66.3	0.886	0.722	62
Bryansk Region	3961	0.614	65.05	0.668	98.6	66.3	0.878	0.720	63
Kostroma Region	4855	0.648	63.65	0.644	98.8	62.6	0.867	0.720	64
Kaliningrad Region	4655	0.641	63.00	0.633	99.4	65.0	0.879	0.718	65
Primorsky Territory	3584	0.597	64.37	0.656	99.5	67.8	0.889	0.714	66
Amur Region	4793	0.646	62.43	0.624	99.3	62.8	0.871	0.714	67
Republic of Marii El	3569	0.597	64.58	0.660	98.8	67.4	0.883	0.713	68
Republic of Altai	4112	0.620	62.37	0.623	98.3	67.8	0.881	0.708	69
Chukotka Autonomous Area	6189	0.689	62.54	0.626	99.4	43.8	0.809	0.708	70
Pskov Region	4524	0.636	61.58	0.610	98.9	64.7	0.875	0.707	71
Kurgan Region	3475	0.592	64.95	0.666	98.4	61.9	0.862	0.707	72
Tver Region	4878	0.649	61.94	0.616	99.1	56.0	0.847	0.704	73
Republic of Buryatia	4014	0.616	62.47	0.625	98.8	63.2	0.869	0.703	74
Ivanovo Region	2694	0.550	63.18	0.636	99.3	69.6	0.894	0.693	75
Republic of Ingushetia	1530	0.455	74.60	0.827	96.2	45.2	0.792	0.691	76
Jewish Autonomous Region	2991	0.567	62.27	0.621	99.1	65.9	0.880	0.690	77
Chita Region	3532	0.595	61.48	0.608	98.8	59.5	0.857	0.687	78
Republic of Tyva	2244	0.519	56.48	0.525	99.1	64.6	0.876	0.640	79

Source: Federal Service for State Statistics, author's calculations.

* Gross Regional Product.

Table 6.2.

The Human Development Index in Russian Regions, 1979-2002

Regions	Human Development Index					HDI ranking				
	1979	1985	1989	1994	2001	1979	1985	1989	1994	2001
1	2	3	4	5	6	7	8	9	10	11
Central Federal District										
Belgorod Region	0.712	0.756	0.761	0.753	0.762	58	32	53	4	12
Bryansk Region	0.729	0.747	0.746	0.706	0.720	29	58	67	42	60
Vladimir Region	0.728	0.756	0.783	0.713	0.724	32	31	14	30	56
Voronezh Region	0.712	0.754	0.750	0.732	0.736	57	35	61	14	39
Ivanovo Region	0.733	0.751	0.788	0.694	0.693	20	43	7	56	70
Kaluga Region	0.725	0.748	0.765	0.717	0.726	38	57	40	28	54
Kostroma Region	0.720	0.741	0.768	0.712	0.720	52	62	35	32	61
Kursk Region	0.703	0.748	0.762	0.729	0.736	67	56	49	16	40
Lipetsk Region	0.711	0.751	0.768	0.748	0.764	60	45	34	6	9
Moscow Region	0.730	0.753	0.760	0.700	0.746	28	38	55	47	27
Orel Region	0.725	0.750	0.776	0.728	0.757	42	52	24	17	14
Ryazan Region	0.726	0.751	0.775	0.721	0.729	34	44	25	24	48
Smolensk Region	0.725	0.750	0.760	0.713	0.729	40	51	56	31	47
Tambov Region	0.687	0.734	0.740	0.709	0.726	72	70	69	37	53
Tver Region	0.720	0.745	0.763	0.705	0.704	51	61	45	44	58
Tula Region	0.731	0.751	0.768	0.706	0.728	25	47	37	43	49
Yaroslavl Region	0.728	0.752	0.764	0.730	0.763	31	41	43	15	11
Moscow City	0.789	0.809	0.810	0.764	0.855	1	1	2	2	1
North-Western Federal District										
Republic of Karelia	0.740	0.763	0.777	0.683	0.731	9	19	22	62	45
Komi Republic	0.737	0.767	0.787	0.719	0.762	15	12	9	26	13
Arkhangel Region	0.730	0.758	0.768	0.698	0.732	27	27	36	50	42
Vologda Region	0.731	0.751	0.773	0.738	0.752	23	49	29	10	20
Kaliningrad Region	0.717	0.745	0.762	0.692	0.718	54	60	50	58	62
Leningrad Region	0.704	0.733	0.766	0.682	0.722	66	71	39	63	58
Murmansk Region	0.746	0.771	0.785	0.709	0.742	6	9	10	38	31
Novgorod Region	0.694	0.737	0.749	0.675	0.727	70	67	64	65	52
Pskov Region	0.693	0.736	0.750	0.669	0.707	71	68	62	68	66
St. Petersburg City	0.759	0.790	0.796	0.747	0.783	2	2	4	7	4
Southern Federal District										
Republic of Daghestan	0.711	0.750	0.748	0.672	0.736	59	54	66	66	38
Republic of Ingushetia	0.715	0.725	0.744	0.653	0.691	55	72	68	71	71
Republic of Kabardino-Balkaria	0.721	0.753	0.768	0.696	0.750	50	40	33	53	24
Republic of Kalmykia	0.709	0.755	0.727	0.667	0.751	61	34	71	69	23
Republic of Northern Ossetia-Alania	0.735	0.765	0.788	0.692	0.756	18	15	8	57	17
Krasnodar Territory	0.708	0.737	0.764	0.711	0.751	62	66	41	33	22
Stavropol Territory	0.708	0.738	0.761	0.726	0.737	63	65	52	19	36
Astrakhan Region	0.725	0.766	0.759	0.700	0.741	41	14	59	48	32
Volgograd Region	0.727	0.768	0.784	0.721	0.745	33	10	12	22	29
Rostov Region	0.726	0.751	0.766	0.709	0.741	35	46	38	36	33

Table 6.2. (continued)

Regions	Human Development Index					HDI ranking				
	1979	1985	1989	1994	2001	1979	1985	1989	1994	2001
1	2	3	4	5	6	7	8	9	10	11
Volga Federal District										
Republic of Bashkortostan	0.725	0.764	0.782	0.748	0.772	37	18	15	5	6
Republic of Marii El	0.705	0.735	0.699	0.698	0.713	65	69	73	51	65
Republic of Mordovia	0.720	0.754	0.764	0.711	0.740	53	36	42	34	35
Republic of Tatarstan	0.737	0.774	0.789	0.756	0.792	16	7	6	3	3
Udmurt Republic	0.721	0.753	0.783	0.708	0.754	46	39	13	40	19
Chuvash Republic	0.707	0.751	0.776	0.719	0.736	64	48	23	27	37
Kirov Region	0.702	0.738	0.761	0.698	0.728	69	64	51	49	50
Nizhny Novgorod Region	0.722	0.753	0.777	0.737	0.755	44	37	21	11	18
Orenburg Region	0.735	0.760	0.777	0.708	0.751	17	23	20	39	21
Penza Region	0.721	0.763	0.760	0.705	0.725	48	21	57	45	55
Perm Region	0.721	0.750	0.771	0.723	0.757	47	50	31	21	15
Samara Region	0.732	0.773	0.797	0.747	0.768	22	8	3	8	7
Saratov Region	0.731	0.768	0.778	0.723	0.741	24	11	19	20	34
Ulyanovsk Region	0.715	0.763	0.769	0.743	0.731	56	20	32	9	44
Urals Federal District										
Kurgan Region	0.721	0.745	0.749	0.691	0.707	49	59	65	59	67
Sverdlovsk Region	0.733	0.757	0.773	0.719	0.745	19	28	30	25	28
Tyumen Region	0.740	0.775	0.850	0.767	0.847	10	6	1	1	2
Chelyabinsk Region	0.741	0.766	0.779	0.715	0.756	8	13	18	29	16
Siberian Federal District										
Republic of Buryatia	0.725	0.752	0.757	0.690	0.703	43	42	60	61	69
Republic of Tyva	0.679	0.722	0.704	0.597	0.640	73	73	72	73	73
Altai Territory	0.738	0.764	0.773	0.695	0.730	14	16	27	55	46
Krasnoyarsk Territory	0.729	0.756	0.784	0.733	0.764	30	29	11	13	10
Irkutsk Region	0.721	0.750	0.763	0.702	0.727	45	53	48	46	51
Kemerovo Region	0.750	0.764	0.750	0.710	0.723	4	17	63	35	57
Novosibirsk Region	0.739	0.776	0.763	0.721	0.749	12	5	44	23	25
Omsk Region	0.747	0.777	0.782	0.736	0.743	5	4	16	12	30
Tomsk Region	0.757	0.781	0.773	0.726	0.776	3	3	28	18	5
Chita Region	0.703	0.740	0.736	0.664	0.687	68	63	70	70	72
Far East Federal District										
Republic of Sakha (Yakutia)	0.726	0.759	0.781	0.706	0.766	36	25	17	41	8
Primorsky Territory	0.740	0.762	0.763	0.690	0.714	11	22	47	60	63
Khabarovsk Territory	0.744	0.749	0.761	0.696	0.749	7	55	54	52	26
Amur Region	0.733	0.755	0.760	0.696	0.714	21	33	58	54	64
Kamchatka Region	0.725	0.756	0.775	0.677	0.722	39	30	26	64	59
Magadan Region	0.739	0.759	0.789	0.670	0.733	13	24	5	67	41
Sakhalin Region	0.730	0.759	0.763	0.634	0.732	26	26	46	72	43

Sources: Federal Service for State Statistics, author's calculations.

The regions are grouped in seven federal districts. which were set up by Decree of the President of the Russian Federation N 849 of May 13. 2000. In order to achieve a long-term dynamic analysis we only cite data on the 73 regions (republics, territories), which already existed in their present administrative-territorial form before 1991. Contemporary names of regions are used.

were mainly regions in the Southern Federal District (Republic of Ingushetia and Republic of Kalmykia) and the Siberian Federal District (Republic of Tyva, Republic of Buryatia and Chita Region).

Leading HDI positions were taken by regions, which managed to reinforce high levels of education with high levels of material well-being

Fastest progress in the HDI during 1979–2001 was by Lipetsk Region (51 places higher), Belgorod Region (46 places), Krasnodar Territory (40 places), the Republic of Kalmykia (38 places), and Perm Region (32 places). The biggest fall was by Kemerovo Region (53 places lower), Primorsky Territory (52 places), Ivanovo Region (50 places), Amur Region (42 places) and the Republic of Karelia (36 places).

Performance of the education component is fairly high and shows little difference between top and bottom regions

Performance of the education component is fairly high and shows little difference between top and bottom regions. This component usually exceeds life expectancy and material well-being (see Annexes to Chapter 6 (A-6.1)).

Social and Economic Factors of Human Development in Russian Regions

Steady economic growth since 1999 is the main driver of recent human development in Russia's regions. The role of economic growth is particularly great since reserves for human development by education improvements have been largely exhausted. The literacy level is close to 100%, and increase of educational enrolment is not possible without a sizable growth of expenditure on education (even in economically successful regions). Lack of potential for further educational advances is aggravated by population trends, which have caused reduction in numbers of schoolchildren (by nearly one million in 2002), and of schools (by 1,200 in 2002), particularly in the countryside.

In view of this, efficient transformation of the GDP increment into social gains has become particularly crucial. Russia's social sphere has still not recovered from the upheaval at the start of the 1990s, when fall of production was the main reason for decline of Russia's HDI. Increase in spending on socio-cultural goals (in 2002 their share in consolidated budget spending rose to 39.6%) does not improve the human development situation (Annex to Chapter 6 (A-6.2)).

Regions sometimes spend their limited social budgets with disregard for priorities. As is seen, for instance, from Diagram 6.3, the summary per capita amount of social spending by consolidated regional budgets and regional branches of extra-budgetary funds does not exert a positive influence on the HDI . Unwise social spending is due to reduced responsibility of regional authorities in managing budget money and weakening of the relationship between taxation and the provision of budget services, which is largely due to the fact that many regional budgets are largely dependent on federal

Table 6.3.

Leading Regions («Top-10») and Outsider Regions («Bottom-5») measured by HDI in 1979-2001

№	Year				
	1979	1985	1989	1994	2001
1	Moscow City	Moscow City	Tyumen Region	Tyumen Region	Moscow City
2	St. Petersburg City	St. Petersburg City	Moscow City	Moscow City	Tyumen Region
3	Tomsk Region	Tomsk Region	Samara Region	Republic of Tatarstan	Republic of Tatarstan
4	Kemerovo Region	Omsk Region	St. Petersburg City	Belgorod Region	St. Petersburg City
5	Omsk Region	Novosibirsk Region	Magadan Region	Republic of Bashkortostan	Tomsk Region
6	Murmansk Region	Tyumen Region	Republic of Tatarstan	Lipetsk Region	Republic of Bashkortostan
7	Khabarovsk Territory	Republic of Tatarstan	Ivanovo Region	St. Petersburg City	Samara Region
8	Chelyabinsk Region	Samara Region	Republic of North Ossetia	Samara Region	Republic of Sakha (Yakutia)
9	Republic of Karelia	Murmansk Region	Komi Republic	Ulyanovsk Region	Lipetsk Region
10	Tyumen Region	Volgograd Region	Murmansk Region	Vologda Region	Krasnoyarsk Territory
69	Kirov Region	Republic Marii El	Tambov Region	Republic of Kalmykia	Republic of Buryatia
70	Novgorod Region	Tambov Region	Chita Region	Chita Region	Ivanovo Region
71	Pskov Region	Leningrad Region	Republic of Kalmykia	Republic of Ingushetia	Republic of Ingushetia
72	Tambov Region	Republic of Ingushetia	Republic of Tyva	Sakhalin Region	Chita Region
73	Republic of Tyva	Republic of Tyva	Republic Marii El	Republic of Tyva	Republic of Tyva

aid. In addition, insufficient financing lowers the efficacy of extra-budgetary funds: resources transferred by employers on behalf of workers (e.g. to the Obligatory Medical Insurance Fund) for providing services to society are inadequate, so that access to, and quality of, medical aid declines and people often have to pay for medical care, which should be free.

Russia's system of incomes and taxation fails to smooth out inequality in living standards. The share of wages[3] in gross domestic product in 2002 was 34.6%, which is a very low level, and in 2003 the legal minimum wage was 450 roubles, or 24.8% of the subsistence level. This is the main reason for the incidence of poverty and deceleration of human development.

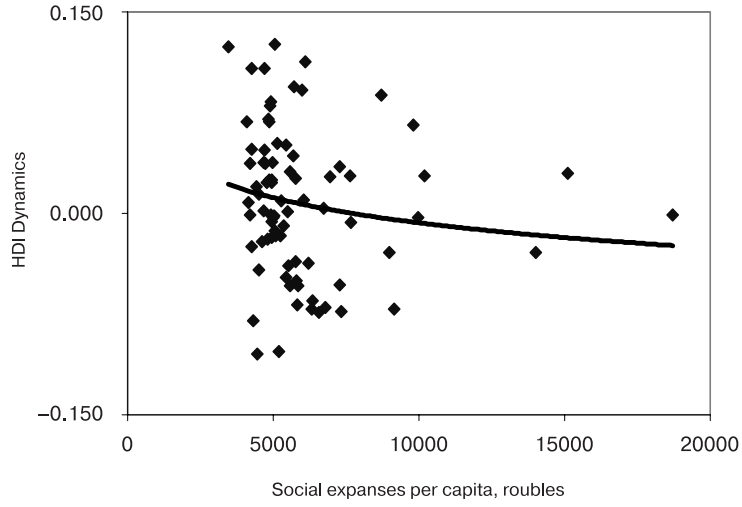
As it is clear from Diagram 6.4, income stratification of society tends to increase with higher rates of economic growth (increase in the rate of growth of gross regional product by 1% is associated with growth of the quintile ratio by 0.11%), which is damaging for human development (Box 6.1).

Inequality is also intensifying in other spheres of social development, particularly in the sphere of education. For example, in 2000 educational coverage of all Russians aged between 6 and 23 years reached 75%, but at the same time the number of homeless children exceeded 4 million, according to estimates by independent experts, suggesting that homeless children are 10% percent of the population aged between 6 and 23 years and 20% of the population aged between 5 and 14 years.

By correlating readings of the HDI and of different components of the HDI – life expectancy, material well-being and education – it is possible to identify groups of «kindred» regions, which need similar regional programs (see Annex to Chapter 6 (A-6.3)).

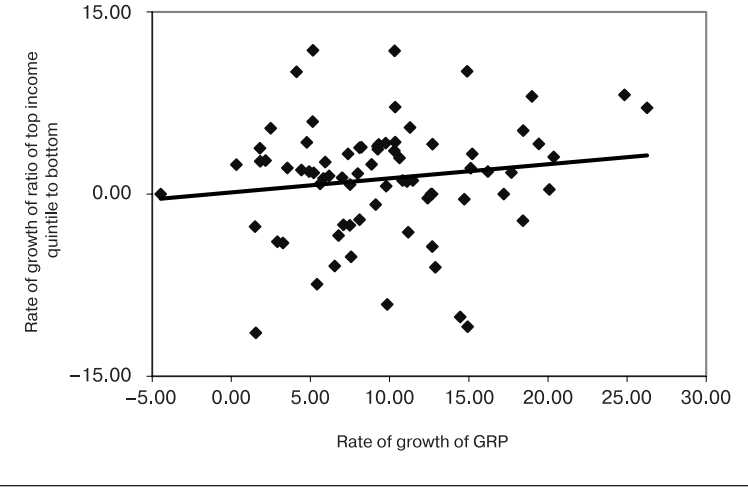
Success of regional development programs can be helped by definition of human development priorities in Russia's regions, but another important contribution to their success is correct estimate of the "conditional value" of changes in life expectancy and education,[4] i.e. estimate of the extent to which the life expectancy and education components of the HDI can be increased by growth of material well-being (in dollars per capita gross regional product at purchasing power parity). This is measured as the number of PPP dollars that are needed for 0.001 summary increase of the life-expectancy and education components.

Diagram 6.3. **Social Spending Per Capita and HDI Dynamics in Russian Regions, 1996-2000**



In Russia there is a definite regional gradient in the conditional value of change in HDI components: human development levels are less sensitive to change in levels of well-being (i.e. life expectancy and education are less dependent on fluctuations of economic conditions) as one moves from the periphery to the center of Russia. The explanation for this seems to be better social infrastructure nearer the center. The conditional value of a 0.001 change in the summary life expectancy and education components in 1995–2000 was $73.80 in the Central Federal District, $35.50 in the

Diagram 6.4. **Dynamics of Gross Regional Product per Capita and Income Inequality in Russian Regions, 1995-2001**



Box 6.1

«We have recognized the necessity of reforms and reconstruction... Reform because much of our trouble today and in the past few years has been due to a lack of understanding of the elementary principles of justice and fairness by those in whom leadership in business and finance was placed...»
«We refuse to regard those who work with hand or brain as different from or inferior to those who live from their own property. We insist that labor is entitled to as much respect as property. But our workers with hand and brain deserve more than respect for their labor. They deserve practical protection in the opportunity to use their labor at a return adequate to support them at a decent and constantly rising standard of living.»
F.D.R's Fireside Chats, Penguin Books, 1993, pp. 48, 81

North-Western Federal District, $88.76 in the Southern Federal District; $56.88 in the Volga Federal District, $59.18 in the Urals Federal District, $38.94 in the Siberian Federal District and $47.00 in the Far Eastern Federal District. The maximum conditional value, observed in the peripheral Southern Federal District seems to disprove the rule, but it can be explained by particularly poor development of social infrastructure in that District, which requires large-scale investments and reacts weakly to comparatively small investments. Conditional values are of essential importance for distribution of resources. For example, all else being equal, one and the same investments will be almost twice more effective in the North-Western and Siberian Federal Areas than in the Central Federal Area.

Knowledge-based Development in Russia's Regions

At the turn of the 21st century world civilization has begun a fundamentally new stage of its development, characterized by intellectualization, technologization, informatization and globalization of the economy

At the turn of the 21st century world civilization has begun a fundamentally new stage of its development, characterized by intellectualization, technologization, informatization and globalization of the economy. A key feature of this development is greater importance of the human factor in economic development and national wealth. According to World Bank estimates, 64% of global wealth in the mid-1990s consisted of human capital, 21% was physical capital and 15% was natural resources. This compares with a diametrically opposite ranking a century earlier. In such countries as the USA, China, Germany, and Britain human resources account for 75–80% of national wealth, whereas the figure in Russia (mainly due to its massive natural resources) is only 50%. Efficient use and development of human capital, and ability to create and master the latest technologies are becoming critical conditions for sustainable rise of living standards and are the chief qualitative criterion distinguishing advanced from underdeveloped nations.

Workers in the modern economy, particularly those who are highly paid and engaged in brainwork, need to be able to independently apply and improve the knowledge, which they receive, to find out and analyze essential information, to work out and implement correct managerial decisions, and to use and program sophisticated equipment. These habits and skills are impossible to acquire without tertiary education. The direct relationship between education and income levels, long understood in economically developed countries, was not proven and recognized in Russia until relatively recently. But measurements at the end of the 1990s established that income levels in Russia in all age groups from 30 to 70 years depend on education levels. In 1998 men aged 35–39 years with 14 years or more of education had monthly income nearly three times higher than their peers with 11–13 years of education, and the latter had more than double the income of men with less than 9 years of education.[5]

Science as well as education is now a direct participant in the production process, and these two essential elements can be united under the heading of knowledge. A special index, the Index of Development of Intellectual Potential (IDIP), has been constructed to assess the impact of knowledge on material well-being in Russian regions, using five indicators that characterize key aspects of intellectual potential: average length of education of employees (an indicator of education levels in the workforce); primary, secondary and higher education coverage (a current indicator of education, closely related to education spending); the number of post-graduate students per 100,000 employed people (indicator of future scientific personnel, now in training); the number of professionals engaged in R&D per 100,000 employed people (an indicator of the scale of science and technology); the share of spending on R&D as a percentage of gross regional prod-

Table 6.4

The Index of Development of Intellectual Potential in Russian Regions in 2000

Regions	Average length of education of employees, years	Educational coverage, %	Number of post-graduates per 100,000 employees	Number of R&D employees per 100,000 employees	Spending on R&D as % of GRP	Index of length of education of employees	Index of education coverage	Index of post-graduate numbers	Index of R&D employment	Index of R&D spending	Index of development of intellectual potential (IDIP)
1	2	3	4	5	6	7	8	9	10	11	12
Moscow City	12.792	100.8	890	6729	1.904	0.830	1.000	0.890	1.000	0.381	0.820
St. Petersburg City	12.496	85.4	607	4343	4.281	0.807	0.854	0.607	0.869	0.856	0.799
Moscow Region	11.812	74.5	87	3076	4.374	0.755	0.745	0.087	0.615	0.875	0.615
Nizhny Novgorod Region	11.363	67.4	130	2789	4.470	0.720	0.674	0.130	0.558	0.894	0.595
Novosibirsk Region	11.276	73.5	258	2106	2.569	0.714	0.735	0.258	0.421	0.514	0.528
Tomsk Region	11.658	77.2	465	1725	1.472	0.743	0.772	0.465	0.345	0.294	0.524
Kaluga Region	11.577	64.0	53	2294	2.628	0.737	0.640	0.053	0.459	0.526	0.483
Ulyanovsk Region	11.111	65.9	101	1300	2.762	0.701	0.659	0.101	0.260	0.552	0.455
Samara Region	11.489	71.7	110	1704	1.784	0.730	0.717	0.110	0.341	0.357	0.451
Voronezh Region	10.959	73.0	188	1238	1.672	0.689	0.730	0.188	0.248	0.334	0.438
Yaroslavl Region	11.100	74.7	124	1338	1.325	0.700	0.747	0.124	0.268	0.265	0.421
Rostov Region	11.390	71.1	190	1002	1.247	0.722	0.711	0.190	0.200	0.249	0.415
Sverdlovsk Region	11.185	66.6	126	1316	1.321	0.707	0.666	0.126	0.263	0.264	0.405
Chelyabinsk Region	11.378	70.1	80	981	1.420	0.721	0.701	0.080	0.196	0.284	0.396
Saratov Region	11.663	70.6	180	804	0.840	0.743	0.706	0.180	0.161	0.168	0.392
Penza Region	11.207	67.0	91	1152	1.248	0.708	0.670	0.091	0.230	0.250	0.390
Omsk Region	11.021	67.4	176	991	0.987	0.694	0.674	0.176	0.198	0.197	0.388
Vladimir Region	11.283	64.9	68	1336	1.085	0.714	0.649	0.068	0.267	0.217	0.383
Republic of Tatarstan	11.294	72.0	162	957	0.586	0.715	0.720	0.162	0.191	0.117	0.381
Primorsky Territory	11.507	67.8	169	607	1.009	0.731	0.678	0.169	0.121	0.202	0.380
Tula Region	10.906	63.4	81	1364	0.983	0.685	0.634	0.081	0.273	0.197	0.374
Republic of Marii El	11.120	67.4	100	559	1.202	0.702	0.674	0.100	0.112	0.240	0.366
Kaliningrad Region	11.633	65.0	124	612	0.813	0.741	0.650	0.124	0.122	0.163	0.360
Perm Region	11.011	65.7	79	969	0.880	0.693	0.657	0.079	0.194	0.176	0.360
Tver Region	11.148	56.0	104	848	1.285	0.704	0.560	0.104	0.170	0.257	0.359
Republic of North Ossetia-Alania	11.607	74.5	184	274	0.296	0.739	0.745	0.184	0.055	0.059	0.356
Orel Region	11.300	74.6	171	467	0.266	0.715	0.746	0.171	0.093	0.053	0.356
Khabarovsk	12.251	73.3	158	240	0.235	0.789	0.733	0.158	0.048	0.047	0.355
Territory Republic of Bashkortostan	11.096	70.5	119	603	0.516	0.700	0.705	0.119	0.121	0.103	0.349
Kamchatka Region	11.588	66.3	34	523	1.027	0.738	0.663	0.034	0.105	0.205	0.349
Tambov Region	11.316	58.9	141	548	0.915	0.717	0.589	0.141	0.110	0.183	0.348
Republic of Mordovia	11.447	70.5	183	350	0.280	0.727	0.705	0.183	0.070	0.056	0.348
Ivanovo Region	11.299	69.6	183	289	0.399	0.715	0.696	0.183	0.058	0.080	0.346
Republic of Karachaevo-Cherkesia	11.643	63.4	135	405	0.663	0.742	0.634	0.135	0.081	0.133	0.345

Table 6.4 (continued)

Regions	Average length of education of employees, years	Educational coverage, %	Number of post-graduates per 100,000 employees	Number of R&D employees per 100,000 employees	Spending on R&D as % of GRP	Index of length of education of employees	Index of education coverage	Index of post-graduate numbers	Index of R&D employment	Index of R&D spending	Index of development of intellectual potential (IDIP)
1	2	3	4	5	6	7	8	9	10	11	12
Irkutsk Region	11.502	66.3	163	425	0.368	0.731	0.663	0.163	0.085	0.074	0.343
Volgograd Region	11.403	68.0	125	410	0.477	0.723	0.680	0.125	0.082	0.095	0.341
Leningrad Region	11.281	53.9	5	813	1.422	0.714	0.539	0.005	0.163	0.284	0.341
Republic of Sakha (Yakutia)	11.204	69.2	90	604	0.452	0.708	0.692	0.090	0.121	0.090	0.340
Kursk Region	10.847	69.7	126	346	0.625	0.681	0.697	0.126	0.069	0.125	0.340
Republic of Buryatia	11.613	63.2	202	305	0.316	0.739	0.632	0.202	0.061	0.063	0.340
Krasnoyarsk Territory	11.218	65.8	143	525	0.407	0.709	0.658	0.143	0.105	0.081	0.339
Astrakhan Region	11.259	67.8	101	376	0.529	0.712	0.678	0.101	0.075	0.106	0.334
Murmansk Region	11.611	63.1	57	543	0.646	0.739	0.631	0.057	0.109	0.129	0.333
Novgorod Region	11.382	65.9	143	373	0.323	0.722	0.659	0.143	0.075	0.065	0.332
Republic of Kabardino-Balkaria	11.069	68.1	179	248	0.214	0.698	0.681	0.179	0.050	0.043	0.330
Republic of Daghestan	10.739	69.5	144	287	0.354	0.672	0.695	0.144	0.057	0.071	0.328
Ryazan Region	11.117	56.4	102	655	0.650	0.701	0.564	0.102	0.131	0.130	0.326
Udmurt Republic	10.898	68.1	112	337	0.347	0.684	0.681	0.112	0.067	0.069	0.323
Altai Territory	10.933	65.2	129	307	0.396	0.687	0.652	0.129	0.061	0.079	0.322
Republic of Karelia	11.355	65.0	113	374	0.223	0.720	0.650	0.113	0.075	0.045	0.320
Belgorod Region	11.185	70.5	82	286	0.248	0.707	0.705	0.082	0.057	0.050	0.320
Chuvash Republic	11.083	70.9	66	290	0.324	0.699	0.709	0.066	0.058	0.065	0.319
Magadan Region	11.841	56.5	50	440	0.672	0.757	0.565	0.050	0.088	0.134	0.319
Komi Republic	11.492	63.3	67	416	0.404	0.730	0.633	0.067	0.083	0.081	0.319
Republic of Altai	11.080	67.8	173	120	0.089	0.698	0.678	0.173	0.024	0.018	0.318
Krasnodar Territory	11.226	63.7	73	359	0.476	0.710	0.637	0.073	0.072	0.095	0.317
Stavropol Territory	11.112	69.0	107	181	0.233	0.701	0.690	0.107	0.036	0.047	0.316
Tyumen Region	11.358	69.3	68	326	0.140	0.720	0.693	0.068	0.065	0.028	0.315
Republic of Adygeiya	11.323	67.4	127	98	0.171	0.717	0.674	0.127	0.020	0.034	0.314
Bryansk Region	11.298	66.3	61	453	0.195	0.715	0.663	0.061	0.091	0.039	0.314
Smolensk Region	11.139	69.0	57	222	0.268	0.703	0.690	0.057	0.044	0.054	0.310
Amur Region	11.655	62.8	73	225	0.232	0.743	0.628	0.073	0.045	0.046	0.307
Republic of Tyva	11.254	64.6	40	320	0.358	0.712	0.646	0.040	0.064	0.072	0.307
Orenburg Region	11.163	68.0	81	146	0.108	0.705	0.680	0.081	0.029	0.022	0.303
Kemerovo Region	11.259	65.1	90	158	0.150	0.712	0.651	0.090	0.032	0.030	0.303
Sakhalin Region	11.541	60.9	25	323	0.381	0.734	0.609	0.025	0.065	0.076	0.302
Kirov Region	10.985	65.4	53	259	0.275	0.691	0.654	0.053	0.052	0.055	0.301
Kurgan Region	10.758	61.9	52	420	0.351	0.674	0.619	0.052	0.084	0.070	0.300

Table 6.4 (continued)

Regions	Average length of education of employees, years	Educational coverage, %	Number of post-graduates per 100,000 employees	Number of R&D employees per 100,000 employees	Spending on R&D as % of GRP	Index of length of education of employees	Index of education coverage	Index of post-graduate numbers	Index of R&D employment	Index of R&D spending	Index of development of intellectual potential (IDIP)
1	2	3	4	5	6	7	8	9	10	11	12
Archangel Region	11.241	63.0	59	197	0.207	0.711	0.630	0.059	0.039	0.041	0.296
Lipetsk Region	11.109	66.6	83	99	0.047	0.701	0.666	0.083	0.020	0.009	0.296
Republic of Kalmykia	11.396	65.2	52	177	0.073	0.723	0.652	0.052	0.035	0.015	0.295
Jewish Autonomous Region	11.116	65.9	63	89	0.127	0.701	0.659	0.063	0.018	0.025	0.293
Kostroma Region	11.070	62.6	104	86	0.078	0.698	0.626	0.104	0.017	0.016	0.292
Pskov Region	11.389	64.7	43	129	0.076	0.722	0.647	0.043	0.026	0.015	0.291
Vologda Region	10.905	64.8	83	68	0.046	0.685	0.648	0.083	0.014	0.009	0.288
Republic of Khakasia	11.095	66.6	45	54	0.031	0.700	0.666	0.045	0.011	0.006	0.286
Chita Region	11.192	59.5	48	140	0.176	0.707	0.595	0.048	0.028	0.035	0.283
Chukotka Autonomous Area	11.449	43.8	0	129	0.255	0.727	0.438	0.000	0.026	0.051	0.248
Republic of Ingushetia	10.535	45.2	72	0	0.000	0.657	0.452	0.072	0.000	0.000	0.236

Source: Author's calculations based on data of the Federal Service for State Statistics.
Regions are presented in descending order, according to their IDIP score.

uct (an indicator of the intensity of scientific research).[6]

Calculations of the IDIP for Russian regions (Table 6.4) show that the leaders are regions with the densest network of higher education institutions and scientific-research institutes (Moscow City, St. Petersburg City, Novosibirsk and Tomsk Regions) or with the most so-called «science cities» (Moscow, Nizhny Novgorod and Kaluga Regions). The vast majority of Russian regions have a comparatively low level of intellectual potential: only two regions have IDIP readings close to or above 0.8; IDIP in four regions is between 0.5 and 0.7; in seven regions it is between 0.4 and 0.5; in 54 regions it is between 0.3 and 0.4; and 12 regions have IDIP readings between 0.2 and 0.3.

Comparison between the IDIP and average per capita gross regional product makes it possible to assess to what extent the economies of Russia's regions are based on knowledge. As is seen from Diagram 6.5, intellectual potential exerts a direct positive influence on GRP (this Diagram shows only those 77 regions, which had average per capita GRP below 120,000 roubles in 2001, but the trend line takes account of 79 Russian regions). However, the influence is not great (the correlation ratio is 0.230).

Diagram 6.5. **The Index of Development of Intellectual Potential in 2000 and Gross Regional Product Per Capita in 2001 in Russian Regions**

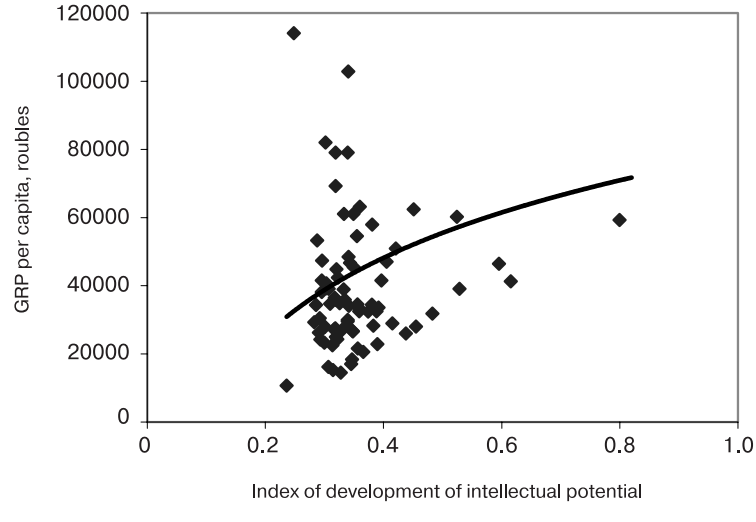
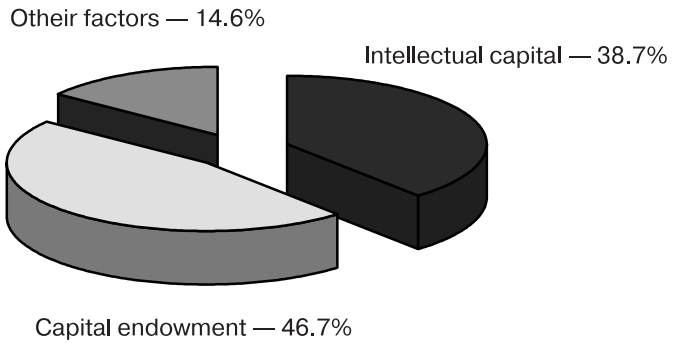


Diagram 6.6. **Influence of Factors Determining Gross Regional Product Per Capita in 64 Russian Regions**



Regions where the fuel industry is a major part of the local economy have specific development patterns, so influence of intellectual potential on economic development was only measured in 64 regions, where the share of the fuel industry did not exceed 15.5%[7] (Diagram 6.6). In these 64 regions (producing 75.3% of total Russian GRP) net influence[8] of intellectual potential on per capita GRP was 38.7%, which is not much inferior to net influence of capital endowment (value of fixed assets relative to the economically active population), which is 46.7%. The impact of intellectual potential is much greater than that of all other factors (including natural resource production): net influence of all other factors is 14.6%.

So most Russian regions are already moving towards a knowledge-based economy, and the answer to the question whether this tendency will become all-embracing and irreversible depends critically on development of human potential (Box 6.2).

* * *

Analysis of the governing principals and factors of human development in Russia's regions suggest the following recommendations for aiding that development:

- to recommend regional executive bodies to design and implement social policy measures based on monitoring of human development;
- to create legislative guarantees of budget financing in secondary and higher education, setting amounts of spending on tuition and maintenance of every student;
- to create a Social Development Fund, financed by a one-percent tax on all financial operations, which will distribute financial resources among regions in proportion to their population size;
- to create a Regional Development Fund, financed by contributions from more economically prosperous regions, to provide support on a competitive basis for regional social projects;
- to broaden tax powers of regional and local administrations (within the framework of the so-called «closed» list of taxes, which is defined by the Tax Code of the Russian Federation) in order to increase per capita social spending;
- to make heads of regional executive bodies personally responsible for non-payment or under-payment of resources to the Obligatory Medical Insurance Fund;
- to design a system of measures and of property and profit tax privileges that will encourage social responsibility at private and state companies;
- to pass a federal law basing the minimum wage on the minimum consumer budget, with due attention to possible inflationary effects;
- to pass a federal law on public-sector wages, assuring decent remunerations in education, science and public health; and to stimulate public-sector wage increases by regional authorities over and above federal norms;
- to introduce a progressive tax scale on incomes exceeding the value of the minimum consumer basket by 10 times or more (Russia currently has a fixed income tax rate);
- to recommend introduction of regional monitoring of intellectual development (based on the IDIP) and technological development (based on the index of technological achievement proposed by the UN Development Program in 2001).

Box 6.2

«Our economy is still very clearly oriented to raw materials. Certainly, natural resources are Russia's natural competitive advantage, and there is not need to be ashamed of that. But the high intellectual capital of our nation is not a lesser but a greater natural advantage. It should be used to propel the Russian economy into high-tech and high-income spheres.»
Vladimir Putin, «The Time of Uncertainty and Anxious Expectation is Past». Program speech before accredited representatives on February 12, 2004 at Moscow State University.

[1] Calculation of regional HDIs used the following indicators: gross regional per capita product recalculated at purchasing power parity in US dollars (based on data of the Federal Service for State Statistics for 1994 and 2001, and on reconstructed data for 1979-1980, 1985 and 1989 (see Yu. N. Ivanov and A. A. Sagradov, «On Calculation and Analysis of Indicators of Human Development in the Regions of Russia», *Problems of Statistics* N 2, 2001, pp. 23-26)); life expectancy at birth for both sexes; adult literacy levels (due to some non-comparability of literacy criteria used in censuses between 1979 and 2002, and non-comparability with international criteria, people with primary education, according to censuses and micro-censuses in 1979, 1985, 1989, 1994 and 2002, are taken to be literate); primary, secondary and tertiary education enrolment (the ratio of the number of students at primary, secondary and higher educational establishments to the total population aged between 5 and 24 years). The use of a full set of indicators, each of which varies by region, makes the HDIs less subject to large swings (see *The Fundamentals of Study of Human Development*. Ed. by N. B. Barkalov and S. F. Ivanov, Moscow, 1998, pp. 47-48).

[2] To ensure comparability of the interrelation of regional HDIs in Diagram 3 with analysis of the dynamics of HDIs in 1979-2001, we only show the results of calculation of indices in the 73 regions of Russia, which have kept their pre-1991 administrative-territorial borders.

[3] Minus so-called latent labor payment, which is statistically defined as the difference between household spending and formally recorded incomes.

[4] See A. A. Sagradov, «Human Development in Russia: Regional Peculiarities», *Human and Social Development*. Ed. by V. P. Kolesov and A. A. Tikhomirov. Moscow, 2003, p. 65.

[5] See M. B. Denisenco and A. A. Sagradov, «Human Capital in Russia: Models of Current and Life Incomes», *The Population of Russia at the Turn of the 21st Century: Problems and Prospects*. Ed. by V. A. Yontsev and A. A. Sagradov, Moscow, 2002, pp. 110–135.

[6] The index of intellectual potential is calculated as the arithmetical mean of the indices of five listed indicators, each of which is computed according to the standard formula of the indices of individual indicators of human development. Minimum and maximum values for each of the human development indicators are as follows: average length of education, from 2 to 15 years; education coverage, from zero to 100%; number of post-graduate students per 100,000 employees, from zero to 1000; numbers engaged in R&D per 100,000 employees, from zero to 5,000 people; share of regional budget spending on R&D, from zero to 5%. In calculating average length of education of employees primary education is assumed to last four years, addition of incomplete secondary education is assumed to give eight years, addition of full secondary with or without primary vocational education (vocational technical schools) is assumed to give 10 years, addition of secondary vocational education (technical secondary schools, MSEIs) or incomplete higher education is assumed to give 12 years, and addition of higher education is assumed to give 15 years. Education coverage is computed as the ratio of those who enter primary, secondary and higher educational establishments to the total population between 5 and 24 years.

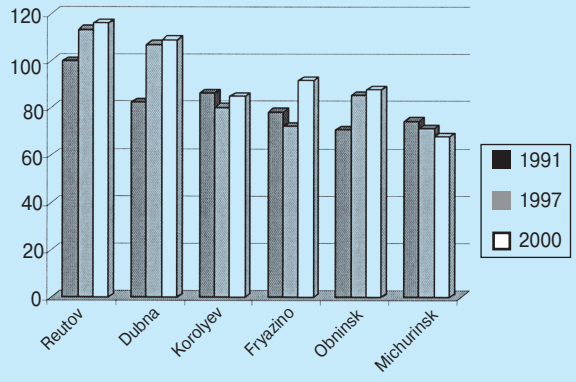
[7] In 1999, the share of the fuel industry exceeded the Russian average of 15.5% in the Komi Republic (56.5 %), Leningrad Region (22.9 %) Astrakhan Region (42.9 %), Republic of Daghestan (15.8%), Republic of Ingushetia (46.9 %), Republic of Kalmykia (21 %), Republic of the Bashkortostan (33 %), Republic of Tatarstan (22.9 %), Udmurt Republic (16.5%), Orenburg Region (36.1%), Tyumen Region (81.8%), Kemerovo Region (33.9%), Omsk Region (15.6%), Tomsk Region (29%) and Sakhalin Region (31.1%).

[8] Defined as a square of the specific correlation coefficient (author's calculations).

Science Cities: Sources of Growth or Centers of Stagnation?

Russia's so-called «science cities» are urban settlements centered on science and technology organizations, with or without a production component. They were mainly formed in the Soviet period. According to the Federal Law on the Status of a Science City in the Russian Federation, about 70 urban settlements in Russia qualify to be science cities, but only seven of them officially had that status at the beginning of 2004. These are: Obninsk (Kaluga Region), Korolyov, Dubna, Reutov, Fryazino (Moscow Region), Michurinsk (Tambov Region), and the science settlement of Koltsovo. The Obninsk administration initiated the Law on science cities and Obninsk was the first to obtain the relevant status.

Figure 1. **Average wages in science cities (the Russia Federation = 100**



Their unique technological and intellectual resources give science cities the potential to act as centers for modernization of Russia's socio-economic space. However, little use has been made of these resources in the transition period. The science cities adapted to new conditions in various ways, exploiting their own scientific and human potential (relatively young, educated and mobile populations) as well as other opportunities.

The most successful of the science cities has been Reutov, which won the TACIS competition «Innovation centers and science cities» in 2001. Its proximity to Moscow helped Reutov to preserve higher wage levels (Figure 1) and low registered unemployment. Migratory inflows led to population growth in the inter-census period (the same happened in Korolyov, another science city adjacent to Moscow). Reutov has also been a leader in housing provision thanks to the residential construction boom, which has occurred in most locations close to Moscow. Growth since Russia's 1998 financial default has improved conditions in Reutov's defense-related high-tech industry, but construction and infrastructure business servicing the capital has grown more rapidly.

Diversification in the structure of employment has also occurred in most other science cities, and this combined with economic growth has improved conditions on local labor markets. Younger age structure compared with the rest of Russia has enabled population growth even in science cities, such as Obninsk, that are far away from the Moscow agglomeration. Michurinsk, which received the status of a science city due to its agricultural science, is an exception: its population had declined by 100,000, according to the 2002 census. Michurinsk also has the lowest levels of wages and housing provision in the group.

Ability of science cities to adapt to the market economy has depended mainly on their specialization and location. Taking an extended group of all urban settlements, which qualify for science-city status (not only those which actually have this status), the least successful among them are those centered on defense technologies, most of which are so-called «closed administrative-territorial entities» (CATEs).[1] Sharp reduction of state financing for the defence sector led to a serious crisis in CATEs, which are subordinated to the Ministry of Defense. Some CATEs with a nuclear specialization (Ozersk, Zheleznogorsk) have benefited from passing of a law that allows importation of radioactive waste for processing in Russia, but «atomic cities» with purely scientific functions are worse off, although they also receive financing from the Ministry of Atomic Energy and benefit from direct state funding of technology organizations (such as the Institute of Experimental Physics in Sarov, and the Institute of Technical Physics in Snezhinsk).

Nearly one-third of all the settlements, which qualify as science cities, are located in the region around Moscow, and

Table 1

Main Socio-Economic Indicators of Science Cities in Moscow Region in 2000

	Migration increment, per thousand	Unemployment level, %	Wage, roubles	Housing provision, man per sq.m.	Per capita turnover of retail trade, roubles	Average size of bank deposits, roubles
Moscow City	7.8	3.8	3229	21.7	79039	2411
Region around Moscow as a whole	5.6	7.4	2269	20.8*	14894	1310
Science cities in the Region. total	5.9	6.2	2056	20.8	10391	1600
including						
Inner belt**	6.2	3.5	2223	21.4	11756	2309
Middle belt	6.2	6.9	1978	19.9	9916	1354
Outer belt	4.4	8.3	1775	19.5	3582	1150

* urban settlements
** the belts correspond to official zoning of the region around Moscow.
Source: Russian Cities in Figures (Federal Service for State Statistics).

proximity of the affluent capital city has mitigated their difficulties in the transition period. Socio-economic conditions in science cities near Moscow are above the average level for the region around the capital, although conditions in Moscow itself are better (Table 1). Commuting distance to the capital is a key determinant of well-being of science cities in the region around Moscow due to attractions of the capital's labor market. So increasing distance from the Moscow ring road makes settlements in the Moscow region less popular as destinations for migration from elsewhere in Russia. Increase of this distance also has an inverse correlation with the average wage, per capita goods turnover, average bank deposits per household, and housing provision, and has a direct correlation with unemployment. Per capita turnover in retail trade, which is closely related to personal income levels, falls particularly fast (by three times) as commuting distance from Moscow increases.

A more detailed analysis of the situation in Dubna and Troitsk, two typical science cities in the region around Moscow, will serve to illustrate the agglomeration effect and show how adaptation to new conditions occurs.

Dubna is in the outer belt of the Moscow region, so it has not turned into a dormitory town for people working in the capital and has had to make the best of its own potential in adapting to the market economy. Dubna has kept its main scientific institutes and high-tech production facilities, but has also developed new economic sectors. Higher education has assumed great importance in Dubna, as in other science cities around Moscow. There has also been rapid development of small and medium-sized firms serving the regional goods market (production of furniture, construction materials, etc) and carrying out R&D and high-tech applications. R&D and high-tech production organizations contribute about 40% of all tax revenues to the city budget, and small and medium-sized firms, a quarter of which are involved in high-tech design and production, pay over 45%. Restructuring of large enterprises is occurring more slowly and many of them are still geared to government defense orders.

Troitsk is a town close to Moscow with a strong specialization in physics. It is home to 10 scientific institutes with an international reputation, and 4,000 people in Troitsk are employed in the town's science sector, representing 40% of the total population. However, nearly 5,000 people, or a third of all those of working age, commute to Moscow for work and study (the numbers are higher if people with two jobs are included). Small business here is less developed than in Dubna: the share of revenues from small business in the town budget is under 20%, so budget revenues per capita in Troitsk were only half of the level in Dubna in 2000. Like most towns immediately adjacent to Moscow, Troitsk has drawn large-scale housing construction, and it is particularly attractive as a place to live due to good ecology and developed social infrastructure. New housing projects will boost the population from 75,000 to 120,000 in the next 10 years. Proximity to Moscow gives Troitsk superior employment and wages levels compared with Dubna, but it also threatens to undermine the town's scientific status, because more and more specialists are moving to the capital permanently and being replaced by immigrants from other regions of Russia and other CIS countries (it is estimated that such immigrants buy 50-70% of new housing in Troitsk). The same process is also diluting intellectual potential of other science cities close to Moscow. Transformation of Troitsk into a dormitory town looks inevitable, and will lead to employment problems as well as putting pressure on social, municipal-service, and transport infrastructure.

On the whole, current socio-economic conditions in Russia are not propitious for development of science cities: having been poles of growth in the Soviet period, they seem unable to play an important role in modernization of today's Russia.

Successful adaptation, as expressed in growth of employment and income levels, has been more swift in science cities around Moscow. But recent developments threaten their conversion into dormitory towns, loss of intellectual and scientific potential due to inflow of less educated migrants, and relegation of science to a less important role in the local economies.

Science cities with marketable specializations have also adapted relatively well. These include towns with atomic power stations, facilities for processing radioactive waste, space research centers, etc. All other things being equal, these science cities have better prospects of remaining science cities, particularly if they are located in outlying zones of the region around Moscow, or if they are located far from Moscow and have their own production of high-tech goods. An educated population, high-quality urban environment and more varied economic structure compared with purely scientific centers enables such towns and cities to diversify their scientific functions and start to develop high-tech clusters, with education facilities, experimental production units, and small and medium-sized business in the high-tech sector.

Science cities remote from Moscow with specializations that have little market demand are worse off. Michurinsk, specialized in agricultural science, and most CATEs subordinated to the Ministry of Defense are the most obvious examples.

Being close to Moscow or having marketable specializations are thus the keys for successful adaptation by science cities, but they are not sufficient to make science cities into sources of growth, although places, which carve a niche on the high-tech market be able to form clusters and technopolises. The status of science cities directly adjacent to the Russian capital is being eroded, since in the post-industrial economy people prefer to live in locations that are most attractive for living (not only for working). Remote science cities, which lack a role in the market economy, are quickly losing their human potential and ceasing to be science cities in any meaningful sense.

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[1] The situation in CATEs was considered in the «National Human Development Report for 2000».

Chapter 7.
Intellectual Capital

Intellectual capital is becoming the basis of wealth in modern societies, determining competitiveness and providing the key resource for their economic development. Companies, government institutions, non-government institutions and organizations all take part in the process of creating, transforming and using intellectual capital. Ability to create and efficiently use intellectual capital increasingly determines the economic strength of a nation and its welfare. A society's openness to imports of knowledge, ideas and information, and ability of its economy to process them properly are crucial for socio-economic development.

Firms and other organizations are now more often knowledge producers than goods producers. Their workers are engaged in the production of knowledge, firms themselves become learners, and innovation is becoming the main source of new value. Intellectual capital is now more of a competitive advantage than physical assets or financial capital.

Transition from the pre-industrial and industrial stages of development to a post-industrial stage entails change in competitive advantages of organizations. In an industrial society labor and capital supplant natural resources as the dominant factors of production, but in a modern society knowledge and intellectual capital gradually come to the fore. The decisive role in contemporary competition is played not so much by a country's population, as in pre-industrial societies, or by access to markets, as in an industrial society. Instead the decisive role is taken by quality and intensity of continuous education of people and organizations. The dominant component of economies is not agriculture, as in a pre-industrial society, or factories, as in an industrial society, but services, and mainly intellectual services.

Establishment of intellectual capital as the dominant factor of social production also means transition to a new value structure of the things we consume. In a process, which occurs more on the micro-level than the macro-level, value creation is shifted from material production to R&D, planning, marketing, sales, transportation and servicing.

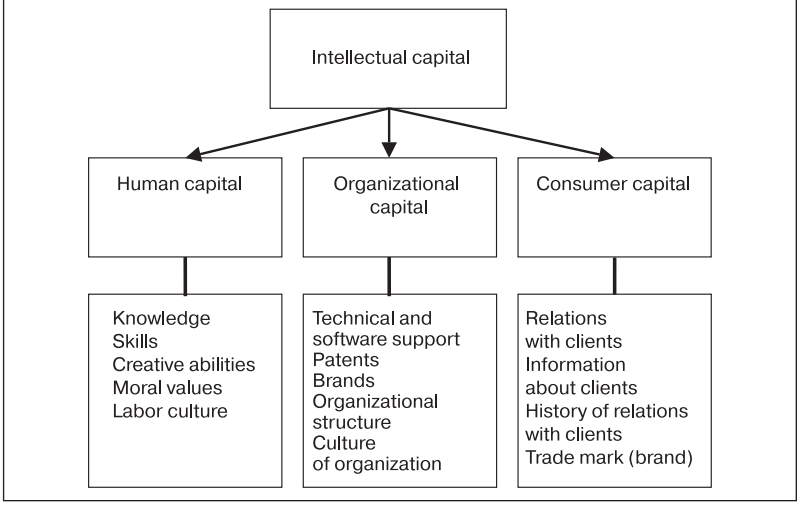
Modern production is in many respects an intellectual activity, dependent on inputs by engineers, accountants, designers, HR specialists, sales and marketing specialists, and experts in information networks. An increasing share of the impact of many firms and organizations depends on application of special knowledge, extensive personnel training and interaction with partners and contracting parties.

The Structure of Intellectual Capital

The Swedish company Scandia was one of the first commercial organizations to apply the concept of intellectual capital in practice and to attempt to measure its components. Beginning from 1996 Scandia's annual reports have presented the company's intellectual capital, divided into human, organizational and consumer components. Scandia measures its intellectual capital as the difference between market appraisal of company value and value of its

The decisive role in contemporary competition is played not so much by a country's population, as in pre-industrial societies, or by access to markets, as in an industrial society.

Figure 7.1. **The Structure of Intellectual Capital**



physical assets. This approach and the identification of basic components of intellectual capital are widespread in the relevant scientific literature (Figure 7.1).

Economic competition is increasingly connected with human capital and intellectual capital as a whole.

In this interpretation *human capital* is that part of intellectual capital, which has a direct bearing on people. It consists of knowledge, practical skills, creative and thinking capacities of people, their moral values and labor culture. Human capital is important for innovation and for any process of renewal.

Organizational capital is the part of intellectual capital that relates to an organization as a whole. It represents procedures, technologies, management systems, technical and software support, organizational structure, patents, brands, organizational culture, and relations with clients. Organizational capital is the capacity of a firm's organization to meet market requirements, and it works in partnership with human capital to transform information. Organizational capital is largely the property of a company and can be bought and sold.

Study and raising of qualifications are necessary conditions for a successful career, and many large Russian commercial organizations have their own subdivisions dealing with training and retraining of their personnel.

Customer, or client capital is a company's links and relationships with clients and customers. To create customer capital is to create a structure that allows consumers to communicate efficiently with company personnel.

Box 7.1.

One example of successful application of IT in the public sector is a software complex set up by the Russian Railways Ministry, which allows economic assessment of the state of the sector and monitoring of sector processes, as well as comparisons with macro-economic processes and coordination with dynamics of currency exchange rates, price levels and stock markets. In the Ministry's IT center it is possible to watch in real time how the economic situation in different regions is influenced by a decline in loading of freight cars. There is also an information service with media assessments of Russia's railways, and tracking of how media affect relations with regions and consignors of goods. The center gives Russian Railway managers an opportunity to assess impact of their managerial decisions.

Another example of successful IT use is at Moscow's Sheremetevo-2 Cargo Airport. Previously, complete day-to-day accounting of freight traffic at the airport itself was not possible, since all computers with access to the information system were situated in offices, at a distance from the airfield. Freight handlers had to count containers by hand with the aid of pen and paper and then go to an office to enter information into the system. Now two aerials have been installed at the airport, and an operator uses a van equipped with a transmitter and computer. The operator has a bar code scanner, and the van is linked to all accounting sub-systems in the airport's computer center. This allows accounting of transit cargoes, which are to be transferred to other companies, and control over cargoes, which arrive in consignments or in parts (the airport serves several hundred bills of lading each day). The main benefit is greater safety of cargo carrying, since the sum weight of cargoes is computed on the spot, avoiding any overloading. It is also now almost impossible to lose a container.[3]

Economic competition is increasingly connected with human capital and intellectual capital as a whole. The fact that a firm cannot fully own human capital is of key importance – human capital belongs to the people who are its bearers. In Russia GUTA Bank was the first to create an Internet trading system, but in March 2000 GUTA's competitor, Alpha Bank, offered better conditions to personnel in its Internet trading unit, so that developers, managers, and front office workers defected to Alpha. As a result the development of this business in GUTA Bank slowed down, and Alpha had a head start to develop the business itself.[1] There is no shortage of similar cases in Russia and other abroad.

Study and raising of qualifications are necessary conditions for a successful career, and many large Russian commercial organizations have their own subdivisions dealing with training and retraining of their personnel. Gazprom, LUKOIL, Sberbank and many other companies have such subdivisions, and Menatep Bank (St. Petersburg) has developed a system of mutual instruction: heads of sub-divisions, who have done particularly well in specific spheres of bank business teach their techniques to other members of staff. The chairman of the Bank's board is personally responsible for organization of this instruction, while the personnel department is responsible for routine work, monitoring who undergoes training and what form it takes (each bank specialist is obliged to go through retraining once every two years). If a member of staff has missed retraining for any reason, he may not receive a new appointment or a rise in salary. The Bank stimulates all forms of learning and even pays for its employees to obtain a second higher education.[2]

Information technology is an increasingly important part of the organizational component of intellectual capital. There are many Russian examples of successful application of IT in various business processes, in both the private and public sectors (Box 7.1).

Information technologies offer major support for effective management, particularly after their rapid progress in the last decade, making it easier for managers, financiers, marketologists and chief executive officers of organizations to process

and analyze economic and social information.

According to estimates by Brunswick UBS Warburg,[4] the volume of the Russian IT market in 2001 was over US$ 3 billion (Russian companies and institutions spent approximately 25% more money on introduction of information systems than in 2000). Main customers on the IT market are state institutions (40-45% of total market volume), large companies (45-50%) and medium-sized business (5-15%). The IT market is developing faster than other branches of the Russian economy, helped in part by the state program «Electronic Russia».

Power Machines, a holding that unites Russian producers of power-generating equipment, has recently made extensive use of organizational capital. Instead of creating its own trade mark for import-export operations, the holding bought Energomashexport, an organization with an existing and recognized trade mark, i.e. it bought intellectual capital. In a further step to extend its intellectual capital Power Machines has begun creation of an after-sales service company.

The growing importance of brands or trade marks (Box 7.2) is connected with the third structural component of intellectual capital – consumer, or client capital. The brand is a peculiar contract between a firm and its customers, a set of mutually agreed obligations. It differs from an advertisement in qualitative terms: in advertisements the producer tells people about the advantages of his goods; but if their advantages are explained by customers to one another, this testifies to creation of a brand. An established brand encourages customers not to spend time and effort seeking and inspecting the quality of competing goods: instead he or she simply trusts a brand (and often forgives its mistakes). Many companies find

Box 7.2.

Brands in Russia

Russian laws on intellectual property use the concept of a trade mark. General issues of registration and use of trade marks are regulated by the Law of the Russian Federation N3520-1 on Trade Marks, Service Marks and Places of Origin (September 23, 1992). In accordance with this Law, trade marks are designations, which distinguish goods and services of some legal or physical person from homogeneous goods and services of other legal or physical persons.

In Soviet days there was a chain of state-run stores in major cities, called «Trade Marks» (later «Beriozka»), in which the Soviet elite could buy imported food and goods. This made Russians perceive practically any foreign commodity as a brand, particularly most desirable items (clothing, footwear, cigarettes and electronics). Japanese domestic electronics, made by Sony and Panasonic, won such a strong position in Soviet consciousness that European and Korean companies have been unable to break down the stereotype to this day, despite offering cut prices for goods that are practically equal in quality to Japanese products.[5]

Perhaps the best example of Russian brand-building is Wimm-Bill-Dann (WBD), a groups of companies with 100% Russian capital, which was set up in 1992, when six businessmen rented a drink packaging line and began production of juice-based soft drinks, which was then a relatively new product in Russia, with an logo that used an amusing mouse-like animal and the inscription «Wimm-Bill-Dann is what you want». The young company then evolved a series of seven natural fruit juices, called «J-7».

This approach was so novel for Russia that many consumers assumed that the new products were imports, although they were in fact made at the Lianozovo Integrated Dairy Products Plant, the largest such complex in Europe, located in the northern part of Moscow, and built years earlier by order of the Communist Party Central Committee. Creation of WBD was preceded by large-scale market research and serious analytical work. Preliminary research showed conclusively that at the end of 1992 Russians preferred foreign foodstuffs to domestic food products. So Lianozovo successfully passed itself off as a foreign company.

WBD then gradually developed into a major food corporation. Lianozovo was privatized and then merged into a holding with the Tsaritsyno Dairy Products Plant and Moscow Children's Dairy Product Plant. New production lines were installed and WBD began cooperation with the international supplier of cardboard drinks packaging, Tetra Pack. WBD also lobbied a new state standard (GOST) to combat imported drinks that pretended to be 100% juice.

Gradually, the new company began to advertise itself as a Russian firm. Its slogan is now printed in Russian, and WBD has followed an increasingly popular ideology by offering dairy and juice products with a «health and energy» bias.

WBD has been successful in competing on equal terms with analogous imported products, It has done so by offering products with a superior price-quality ratio and, most importantly, by creating memorable trade marks.

The advertising campaign to promote J-7 reached unprecedented heights for a Russian firm in 2001, when WBD helped to set up a long-running TV show «The Last Hero», set on the exotic island of Bocas Del Toro, where two teams of ordinary Russians formed into "tribes" and competed for survival. This put the company among the ten biggest advertisers on the Russian market.

Brands are a considerable part of WBD's market value, and its owners took advantage of this in 2001, becoming the first Russian food company to offer to a significant stake (25% plus one share) to foreign investors as American Depositary Receipts (ADRs). WBD raised $134 million, selling 7,480,000 shares issued by the company and 3,140,000 shares offered by existing shareholders. The money was used to fund production increases and new acquisitions.[6]

Human, organizational and consumer capital interact with one another, and need to be treated together for investment purposes, to make them support one another and offer synergies in a cross-effect between intangible assets.

it worthwhile to have a director, who is responsible for their trade mark, orienting management towards development of the trade mark and improving competitiveness of the firm as a whole.

The Measurement of Intellectual Capital

Western economic literature and firms all over the world use Tobin's ratio to measure the value of intellectual capital. Tobin's ratio is the relation of the market value of a company to the cost of replacing its tangible assets (buildings, equipment and stocks). The market value of a company can be determined by its capitalization on the stock market. But the most accurate measure occurs when the company is bought by another firm.

If the price of a company significantly exceeds the price of its tangible assets, its intangible assets (the talent of personnel, efficiency of control systems, management, etc.) are highly appreciated, and any buyer is acquiring mainly intangible assets and not physical assets.

Values of the Tobin ratio for most companies today vary from 5 to 10 and higher for R&D-intensive firms. For instance, in 1995 IBM paid $3.5 to swallow Lotus, whose tangible assets were valued at $230 million, implying a Tobin ratio of 15.2. Some companies in the software and Internet business may have Tobin ratios of several hundreds. In that case tangible capital is not part of their value creation: their dominant production factor is intellectual capital. The average Tobin ratio changed little on average in the 1960s and 1970s, fluctuating between 1 and 2, but there has been a sharp growth from the start of the 1980s and it had reached 6-7 by the start of the 21st century, with high-tech companies in the lead.

Successful Russian companies have also achieved fairly Tobin ratios, as can be seen

Table 7.1.
The Tobin Ratio in Major Russian Companies

Company	Assets, millions of roubles, 2002	Capitalization, millions of roubles, October 2003	Tobin ratio
Baltika	18,505	45,762	2.5
Wimm-Bill-Dann	6,100	23,760	3.9
Vimpelcom	34,686	95,315	2.7
Norilsk Nickel	221,458	352,944	1.6
Rosbusinessconsulting	560	5,550	9.9
Primorsky Steamship Line	1,067	2,456	2.3
North-Western Steamship Line	1,613	869	0.5
Slavneft-Megionneftegaz	40,946	41,265	1.0
Surgutneftegaz	529,260	640,667	1.2
Tatneft	139,999	76,254	0.5
Yukos	151,136	805,320	5.3
LUKOIL	572,564	558,990	1.0
Moscow City Telephone Network	23,578	26,666	1.1
Rostelecom	40,949	43,995	1.1
UES	341,151	353,250	1.0
Mosenergo	119,633	61,651	0.5
Severstal	55,959	65,650	1.2

Table 7.1 illustrates the success of some Russian companies in using competitive advantages and modern management technologies to create their own expensive brand, leading to a high Tobin ratio. This suggests that these companies have considerable intellectual capital. Intellectual capital of the brewing company, Baltika, consists mainly of its own system of distribution and a well-known brand. WBD has its popular brand as well as a successful development strategy. Intellectual capital of Rosbusinessconsulting stems from its main business, which is collection, processing and dissemination of business information. Vimpelcom is a cellular telecom company, with considerable high-tech capacity, explaining its high Tobin ratio. As can be seen, the Tobin ratios of transport companies vary, and are higher in more successful companies.

It is interesting to compare Tobin ratios of Russian companies in the raw-materials sector and outside it. In 2003, Yukos stood out as a raw material (oil) company with a high Tobin ratio thanks to its efforts to improve management, develop its stock market, rationalize its organizational structure, and develop its personnel policy. The same cannot be said for many other Russian raw-material companies.

Such companies as Moscow City Telephone Network and Rostelecom (the Russian long-distance telecom monopolist) had relatively high Tobin ratios in 2003, although both have much scope for further improvement.

Table 7.2. shows some Russian companies with Tobin ratios lower than one, implying negative intellectual capital, i.e. implying that the company's management, organizational structure and customer relations reduce instead of increasing value.

Such companies would be subject to liquidation or sale in free market conditions because more money can be raised from sale of their assets at balance-sheet prices than from staying in business. In practice, however, this does not happen for a number of reasons. Sometimes there are no buyers. In other cases government prevents liquidation of a company and of related production because of the leap in unemployment, which this would entail.

Values of the Tobin ratio below one may also suggest that a company is undervalued by the market. The reason for this is different in different cases, but it means that the company has to overcome major hurdles.

Table 7.2.
Some Russian Companies with Tobin Ratios Below One

Company	Assets, millions of roubles, 2002	Current capitalization, millions of roubles	Tobin ratio
AvtoVAZ	100,655	20,604	0.2
Gazprom	2,471,197	864,120	0.3
Kazan Helicopter Plant	5,551	1,571	0.3
Kamaz	58,721	6,600	0.1
LOMO	2,842	584	0.2
Elektrosila	3,799	1,889	0.5

The Tobin ratio is the main financial measure of intellectual capital, but non-financial estimates can also be used to analyze competitiveness of an organization and the factors underlying this competitiveness. Such estimates can be made internally and externally (by personnel, customers shareholders and investors), and are valuable for determining strategy and identifying long-term trends in development of the respective organization.

The nature of the value of various elements of intellectual capital differs. Intellectual capital concentrated in the skill and proficiency of workers usually increases with time. Patents, on the contrary, quickly lose their value unless they are materialized in products or licensed. Value of consumer capital also tends to dwindle unless special efforts are made, since customers can easily switch to a competitor.

The following indicators can be used to assess *human capital*:

- the set of human resources of an organization and management of these resources;
- employee morale;
- sales per employee;
- education level of employees;
- experience of employees (number of years in this business);
- expenditure on training per employee;
- working days per year spent on the upgrading of employees;
- employee turnover.

The Tobin ratio is the main financial measure of intellectual capital, but non-financial estimates can also be used to analyze competitiveness of an organization and the factors underlying this competitiveness.

Table 7.3.

Public Spending on Education, Health and Defence

Country	State spending on education as % of GDP	State spending on health as % of GDP	State spending on defence as % of GDP
Norway	6.8	6.6	1.8
USA	4.8	5.8	3.1
Israel	7.3	8.3	7.7
Russia	4.4	3.8	3.8

...the brain drain from Russia was about $25 billion a year, which is comparable to estimated annual outflow of financial capital from the country in the same period.

Knowledge-based development requires extensive systems of education embracing ever larger groups of the population to ensure growth in the share of highly skilled workers in the workforce and to encourage continuous education of employees.

The human capital represented by employees is sometimes assessed by capitalization of their wages: in this case wages are regarded as a kind of interest on human capital, so that, if the annual wage is 10,000 roubles and interest on capital is 10%, each worker represents one million roubles of human capital. The sum of intellectual capital of all workers in an organization then constitutes its total human capital.

This provides a technique for measuring drain of human capital from Russia: if the average annual drain of specialists in the 1990s was 50,000 people a year, and the average annual salary of a highly qualified specialist in the West is $50,000, then each specialist is valued at $0.5 million, so the brain drain from Russia was about $25 billion a year, which is comparable to estimated annual outflow of financial capital from the country in the same period.

Overall human capital in Russia can be measured using standard indicators and indicators used in reports by the United Nations Development Program. In particular the UNDP report for 2002/2003 puts life expectancy in Russia at 66.6 years. This is one of the lowest indicators in the world today. In addition, the probability of surviving to 60 years of age is lower in Russia than in any OECD country, and than in any other country of Central and East Europe.

Spending on education in Russia has been low in recent years, but has been on a growing trend since the early 1990s and Russia has a chance of catching up with more advanced nations if this trend continues.

Russia is a world leader by the number of scientists and engineers engaged in R&D research per one million people. In 1996-2000, this indicator stood at 3,481 in Russia, surpassed only by Norway, Iceland, Sweden, Switzerland, USA, Japan, Finland and Singapore (the latter countries have consistently been associated with high levels of intellectual capital in recent years). However, the ratio of R&D specialists in society has been declining quite rapidly in Russia: some estimates suggest that it halved in 2000-2002. This suggests that relatively high R&D employment is not so much a sign of high potential as a reflection of slow adjustment from the Soviet employment structure, with its abundance of scientists and engineers.

Data in Table 7.3 show that Russia still spends unjustifiably small sums on education and health compared with other countries.

Taken together these data show that Russia has made a late start in the race for leadership in intellectual capital, particularly as regards its human capital component.

Knowledge-based development requires extensive systems of education embracing ever larger groups of the population to ensure growth in the share of highly skilled workers in the workforce and to encourage continuous education of employees. These systems need to encourage creativity and flexibility, so that workers can adapt to constantly changing needs of the economy, and should also enable international recognition of skills and academic degrees.

The knowledge-based economy makes ever greater demands for professional qualifications. OECD countries have seen growth in the share of workers with higher education in recent years and a major economic payoff from higher education. The share of the adult population with higher education in developed countries rose from 22% to 41% from 1975 to 2000, i.e. it nearly doubled, and even this rate of growth of workers with higher education is not enough to meet demand. The deficit is covered by importation of skilled specialists from other countries.

This brings us again to the problem of the so-called brain drain, which has recently been aggravated in some donor countries, including Russia. The term «brain drain» was first used in Britain to describe outflow of highly-skilled specialists, particularly in basic research and applied science, from Britain to the USA and Canada (the origin of the term should serve as an antidote to any view of brain drain as an exclusive problem of less developed countries).

The USA has done particularly well in attracting specialists. More than one million specialists from Asian countries, Russia and elsewhere have moved to the USA since the early 1990s. It is notable that 25% of them studied in US universities and colleges, so higher education has served as a powerful source for replenishment of skilled personnel in the USA. The human capital, which the USA has thus acquired, can be approximately valued at $500 billion dollars, which is a large amount even for such a huge economy. Skilled manpower from abroad can also produce a synergetic effect thanks to cross-cultural interaction, and many countries have recently used special measures to stimulate inflow of foreign specialists. Germany and France now have special programs to attract highly-qualified specialists, and Singapore is hosting skilled workers from Malaysia and China.

Outflow of specialists from Russia to date has not been offset by inflow of skilled personnel (largely Russian-speakers from the Commonwealth of Independent States). Many of the migrants to Russia from the CIS are builders, unskilled laborers and tradesmen. Russia needs to devise an effective strategy for changing the structure of import and export of human capital.

The main components of the consumer capital of any organization are as follows:

- customer make-up, ways of dealing with customers and success in satisfying their needs;
- profit per customer;
- sales per customer;
- customer base as a determinant of the image of an organization;
- the number of customers and how long they have been the organization's customers;
- repeat orders.

Estimates of a country's overall consumer capital can use such indicators as openness to various cultures and linguistic skills (this is a very important indicator since it facilitates exchange of ideas and people, involvement of people in global processes and cultural exchange, etc.).

A country's consumer capital can be measured by investment ratings, by analyzing the character of contracting parties, and also by assessing the image of the country and of its economy. The challenge of improving Russia's image arose in the mid-1990s, when big Russian corporations encountered problems at an international level due to the scandalous reputation of some Russian companies and the deteriorating reputation of Russia as a whole. Russian investment brokers were forced to ponder Russia's image for the first time ever, and in the summer of 1998 leading Russian market-markers created the Financial Council of Russia. They proposed an unprecedented initiative in the form of a PR campaign targeting foreign investors with the aim of improving Russia's investment image. The initiative was unprecedented because it was funded by Russian profit organizations, instead of being funded by the International Development Association or the World Bank. The brokerage firms organized a tender and worked together with the tender winner, the international consulting company Burson-Marsteller, on a series of measures to promote the Russian stock market and shares of major Russian enterprises in the West.

It is symptomatic the impetus for a professional effort to improve the business image of Russia came from stock market participants. The stock market is always most sensitive to latest information and trends in the economy.

In the autumn of 1999, after the 1998 crisis, Russian business representatives made a second attempt to address the problems of Russia's reputation. The 2015 Club, consisting mainly of top hired managers of leading Russian and Western corporations, took the image issue as its main concern. Various projects for creating a positive image of Russia abroad (including suggestions by PR agencies like Mikhailov & Partners and Imageland-Edelman PR) are still being put forward and considered. These efforts may produce a substantial result if the initiators of the project can find a common language with government. Government in this case has a role, not only as a customer placing an order, but as a key participant in the process of projecting Russia's image to society and the world at large.

Organizational capital of an individual company can be valued using the following indicators:

- scale, functions and application of information systems;

The share of the adult population with higher education in developed countries rose from 22% to 41% from 1975 to 2000, i.e. it nearly doubled...

Diffusion of knowledge happens in all countries, but is not always accompanied by dynamic economic growth and a high and sustainable standard of living.

Social capital is created on the micro-level (households, micro-regions, villages), on the meso-level (a region, where different associations are active, generates interaction between business structures and other unions) and on the macro-level.

- make-up, equipment and efficiency of administrative systems and organizational structures;
- investments
  - in new branches and new methods of management (these investments are usually regarded as expenses, but they should be constantly analyzed and reflected in relevant annual documents, and they can be better represented as a share of sales or of added value), and
  - in research and development;
  - in IT (it is also possible to refer to the number of computers per employee);
- values, relationships, etc.;
- the stability of an organization, its age, employee turnover, the share of personnel with a record who have worked in the organization for less than two years.

Diffusion of knowledge happens in all countries, but is not always accompanied by dynamic economic growth and a high and sustainable standard of living. In order to exert a substantial influence on economic growth dynamics, knowledge diffusion needs to be efficient and adequate to the needs of economic growth. Many factors have an impact on this process, including the cultural factor associated with the stereotypes of behavior and child upbringing in the family. For example, authoritarianism and related over-protection of the child in the family tend to lower stimuli for self-development. A clan system also usually discourages development of competitive qualities of the personality.

R&D as a percentage of GDP is highly significant for estimation of intellectual capital. Its level in Russia in 2000 was one percent, whereas in Sweden it was 3.8%, in Japan 3%, in Finland 3.4% and in Israel 3.6%.

A relatively new concept in economic science – social capital – can also be treated as a part of organizational capital. Used in a broad sense, the term «social capital» embraces a fairly large group of phenomena: social institutions, shared values, relationships between people, and also their attitudes to other phenomena, which (together) govern interaction between people and have a contribution to economic and social development.[7]

There are two forms of social capital:

- structural capital, which represents networks, associations, institutions, and also rules and regulations, which regulate their functioning;
- cognitive capital, which includes relationships between people, rules, behavior, shared values and trust.

These two forms of social capital are relatively independent, since they can exist relatively independently from each other.

Social capital is created on the micro-level (households, micro-regions, villages), on the meso-level (a region, where different associations are active, generates interaction between business structures and other unions) and on the macro-level. The last level has been studied fairly well within the framework of so-called «institutionalism»: it is the level, which institutionalism recognizes as a leading factor in countries' economic growth. It is important that these three levels interact with one another and produce synergetic effect: social capital is mutually complementary at various levels, so it cannot produce a significant effect if one of its levels is insufficiently developed.

The word «capital» is not redundant in the term «social capital». Like physical capital social capital is a reserve that induces a flow of values influencing the economy. It promotes exchange of information, decision-making and collective action. Like physical capital it requires investments, and periodic maintenance (in the form of social interactions or special measures to sustain confidence in society).

However, social capital differs from physical capital in that its amount does not diminish in the process of use (that is, it does not amortize). On the contrary, social capital loses its value precisely by not being used. It cannot be created on an individual basis, but is an exclusively social phenomenon, existing only in the context of and within a particular society.

Certain authors are against use of the word «capital» in the term «social capital». But terminology is less important than introduction of a new concept that allows study of relatively new aspects of social development on an interdisciplinary basis. Social capital facilitates economic development mainly by reducing transaction costs. Local networks of interaction between people reduce the price of information and

make it more accessible, particularly information on product prices, markets and new opportunities. The spread of local networks and the high degree of confidence, which usually attaches to them, encourage ever quicker and more efficient collective decision-making and stimulate effective joint action. Empirical research proves that activity on the micro-level within the framework of local associations, and also levels of public trust, correlate with economic development.

Levels of investment in civilian R&D, patent registration, and appearance of new high-tech companies (in biotechnology, programming, software, etc.) serve as relatively independent measures of a country's organizational capital.

Indirect indicators of organizational capital include levels of development of processing infrastructure and transfer of information in society. Such indicators include levels of telephone provision and Internet access. Russia is far behind developed nations by the number of telephone stationary lines per 1000 inhabitants: there are 24.5 lines per 1000 people in Russia (Trinidad and Tobago has a similar indicator), whereas Norway has 732 lines, Sweden 739, Belgium 498, and the USA 667. Russia is also a laggard by another significant indicator – the number of mobile telephones per 1000 inhabitants. In 2001, there were only 53 mobile telephones in Russia per 1000 people, compared with over 500 in developed countries and 314 in a less developed country such as Malaysia. Russia is far behind more advanced countries by its number of Internet users. In 2001 there were 29 users in Russia per 1000 people, compared with 600 in Iceland, 520 in Sweden, 330 in Britain, and 500 in the USA.

One other indicator of a country's intellectual capital is the share of high-tech in total exports. The share in Russia is 8%, compared with 32% in the in the USA, 32% in the Netherlands, 48% in Ireland, 60% in Singapore, and 32% in Mexico.

It is seen, therefore, that estimates of intellectual capital can be both quantitative and qualitative. Indicators of intellectual capital can be divided into quantitative financial indicators (chief among which is the Tobin ratio) and indicators characterizing particular components of intellectual capital, which are organizational and consumer capital. Indicators of the latter two can also be of a quantitative or qualitative character.

Intellectual capital can be estimated for a single organization, for the national economy as a whole, and for a separate region. This is particularly important for identifying strategic priorities in socio-economic development of national economies, which are moving towards a knowledge-based, post-industrial society.

* * *

The growing importance of intellectual capital is clear not only to managers of companies and organizations, but also to policy-makers worldwide. Attention is increasingly focused on indicators, which measure trends in development of intellectual capital in various countries and regions. These measurements reveal the outlook for future economic growth and socio-economic development, and enable monitoring and management of key factors.

Some leading Russian companies and organizations already possess fairly large intellectual capital. However, there is still a lack of such capital in many big Russian companies, and there are even some cases of negative intellectual capital. Quantities of intellectual capital in the country as a whole are significantly lower than that would be the case if economic development was proceeding more successfully.

Russia has substantial reserves for rapid growth of intellectual capital. The country has accumulated considerable human capital, as expressed in a high standard of education and a considerable number of scientific workers. However, the two other components of intellectual capital –organizational and consumer capital – are inadequately developed. Successful development of these two components could lead to a significant synergetic effect, producing growth of the intellectual capital of the country as a whole and of its individual economic units.

[1] See *F.S. Svarovsky* A Secret Weapon, *Vedomosti*, August 28, 2000.

[2] See *Expert* magazine. No. 36, 2000, pp. 88—89.

[3] Yu. Pukha and S. Kolyada, *Business on a Short Leash* — www.ione.ru.

[4] *The Company* magazine, January 14, 2000, p. 66.

[5] M. Chernysh. «Russia Maintains Her Reputation», *Report*, No 5, May 2000.

[6] See *Intellectual Capital – Strategic Potential of Organizations*. Ed. by A.L. Gaponenko and T.M. Orlova, 2003, pp. 49—58.

[7] *Understanding and Measuring Social Capital: a Multidisciplinary Tool for Practitioners.* Washington, D.C., 2002.

Chapter 8.
Attitudes to Knowledge in Society

Recent years have brought huge changes in Russian education, science, and the highly skilled and high-tech sectors of the economy. These changes are ongoing and their long-term effects are still not fully clear. What is clear is that institutional transformations in the production, reproduction, and practical application of knowledge can only maintain and enhance intellectual standards in Russian society if ordinary Russians feel that they have a stake in the knowledge process, are positively disposed towards it, and are ready to back up these attitudes with real actions. If these conditions are lacking, knowledge-based development becomes problematic. This is the issue, which the current chapter aims to analyze.

General Attitude to Education

Reproduction of a society's intellectual capital occurs mainly through education. Changes in education over the last 15 years have occurred against a background of sustained new trends in the attitude of Russian people towards it. There has been a steady growth of interest in education from the mid-1990s, after a temporary waning of interest at the start of radical market reforms. The revival is witnessed by development of such elements of the educational infrastructure as supplementary lessons in school for payment, a network of home tutors, pre-entry departments run by higher education establishments, etc. Competition to enter higher and specialized-secondary education establishments is growing; and admission of students for both paid and free places is on the increase. By and large, a good education has become prestigious.

There is a clear thirst for education among people just starting out in life. Eagerness to obtain higher education has been a key feature of this age group since the 1990s: young people, who complete secondary school, want to pursue higher education. This aspiration is greatest among urban schoolchildren, particularly sons and daughters of senior officials and managers, highly skilled specialists, and the well-off: 75% to 90% of children in these groups plan to go onto higher education.[1]

Whether or not school leavers actually enter higher education depends largely on parents. The Public Opinion Foundation found that 63% of parents of school leavers want their children to obtain higher education,[2] and are ready to meet the major costs, which this involves, including extra lessons at school, private tutors, preparatory courses offered by higher education establishments, textbooks, transport (if the establishment is located in another town), bribes to ensure that results of entrance examinations are favorable, etc. It was found that 42% of parents are ready to spend as much as is necessary for their children to receive higher education.[3] Some authors report that 56.2% of polled parents said that they would bribe officials or teachers of higher education establishments to secure admission for their children: 18.9% of them could afford to pay $1000 to $3000 for this purpose, 6.4% were willing to offer $3000 to $5000, 2.8% named a figure between $5000 and $10,000, and 28.1% said that they would pay "the asking price". The average cost of preparing a child for admission to a Russian higher education establishment is $1000, but the figure is much higher in Moscow and St. Petersburg,[4] and parents are willing to make the necessary sacrifices. For instance, school teachers (who are notoriously low-paid), were ready to give up their summer holiday, purchases of clothes and domestic appliances, visits to distant relatives and friends, buying books, going to the theatre, cinema, concerts, etc. Very few respondents (4.2–9.1%) were willing to let their children do without higher education.[5]

Clearly then, education is highly valued in contemporary Russian society, and Russians are reconciled to major expens-

There has been a steady growth of interest in education from the mid-1990s, after a temporary waning of interest at the start of radical market reforms.

es and sacrifices to get their children educated.

The Significance of Education in Russia

The aspiration to obtain education is an important resource for preserving and increasing intellectual capital, but only if it reflects a genuine desire to acquire knowledge for subsequent use at work. To what extent is this the case in Russia?

There is general awareness now in Russia that a person's success in life (including material success) depends on a higher education diploma and the attached prestige.

Polls show that Russians take a mainly utilitarian approach to education. It is seen as a way of achieving a higher social position, with accompanying material well-being and power, rather than as value-in-itself. This approach is partly a legacy of the Soviet epoch, but it has intensified in recent years, and the value of education has been firmly subordinated to the goal of enrichment. Education is valued to the extent that it generates income and enhances social status; otherwise, it is deemed to be of little use (Box 8.1).

There is general awareness now in Russia that a person's success in life (including material success) depends on a higher education diploma and the attached prestige. Belief at the start of the 1990s that education is not necessary for success has given way to almost universal belief that it is in fact necessary.

Orientation of people to a particular level of education reflects their ambition to achieve a particular social status, and the education system is a means to realize that ambition. The labor market sets precise and very different values on school-leaving certificates, diplomas from specialized secondary education establishments, vocational schools, and higher education establishments (including diplomas *cum laude* and those issued by comparatively prestigious establishments), and employers differentiate between candidate and doctoral diplomas (roughly PhD and advanced PhD). A school-leaving certificate is valued mainly as an intermediate stage on the way to higher education (only 2% of school-leavers in 1998 went straight to work). Specialized secondary and vocational education prepare young people for semi-skilled professions and trades (specialized secondary education produces nurses, primary school teachers, etc., and is considered to be a cut above vocational education, which produces electricians, machine operators, etc.). Specialized secondary and vocational education, which young people enter after completion of secondary school, is not classed as higher education, although those who complete such establishments may then proceed to higher education. A graduate's degree from an establishment of higher education, especially from a prestigious establishment, considerably increases employment opportunities, although it cannot match candidate and doctoral diplomas in competition for prestigious and lucrative positions in private companies.

So hunger for education among young Russians and their parents is, by and large, a reflection of their striving for higher social status. Acquiring knowledge is not a bad thing, but only if it is useful for enhancing status. Other, "less practical" knowledge usually holds little attraction (Table 8.1). This utilitarian attitude to education puts strong pressure on educational establishments, from schools to universities, prompting them to adapt their curricula to the current needs of the market.

Eagerness of young men to enter higher-education, and willingness of their parents to offer material support for this, is reinforced by the possibility of avoiding military service by entering college. This is part of the reason for the growth of competition to enter higher education in recent years.

Box 8.1.

The Place of Education in the Value System of Russian Youth

"What do Russians believe to be the main aims in life for young people today?" Most respondents (53%) believe that the main aim of young people today is enrichment and material well-being ("they all want to become millionaires"; "to live better than their parents"; "in their eyes, money is the most important issue"). Very few respondents credited young people with any other life aim (figures are a percentage of answers by poll respondents):
education: 19%;
employment, career: 17%;
self-fulfillment: 4%;
pleasure, entertainment, fun: 4%;
starting a family: 3%;
achieving freedom and independence: 1%.

The Public Opinion Foundation. All-Russian poll of the urban and rural population, 13th July, 2002. Sample: 1500 respondents.
Source: http://bd.fom.ru/report/cat/humdrum/work/of022603.

Table 8.1.

Opinions of young people on the value of higher education, percentage of answers*

Higher education is...	Former students of		
	secondary schools	specialized secondary schools	vocational schools
necessary for a career	57.9	40.0	42.1
necessary to get an interesting job	53.7	54.3	57.9
a way of getting the knowledge, which is necessary for knowledge-related employment	29.5	34.3	42.1
a value-in-itself	24.2	14.3	5.2
a means to avoid military service	14.7	2.9	26.3
a way of finding a better wife or husband	10.5	2.9	-
a tradition in our family, which I would not want to depart from	8.4	-	5.2

*The sums are more than 100%, since respondents were allowed to choose up to three answers.
Source: D.L. Konstantinovsky, L.P. Verevkin (ed.), *Obrazovanie i nauka v protsesse reform: Sotsiologichesky analiz (Education and Science in the Course of Reforms: Sociological Analysis)*. TsSP Publishers, Moscow, 2003, p. 78 (in Russian).

Although they aspire to obtain education, young people are aware that knowledge by itself is not a guarantee of high or even acceptable social status: the salaries of most people who take part in production, reproduction, and application of knowledge (teachers of secondary and higher education establishments, medical doctors, scientists, engineers, many skilled workers) are low. There is little enthusiasm today for a career in these fields, and students who have completed the appropriate training often choose more promising careers, unconnected with their specialization. Their professional knowledge finds no application and is lost.

Young people, starting out in life, are oriented to success in terms of material well-being and high consumption, and a good education is simply a means towards this. This treatment of knowledge as a mere tool, combined with inequality of access to education at all levels (from primary school to higher and doctoral levels), means that establishments, which give a better chance of subsequent success, attract young people from well-off families, who use their diplomas as a springboard to high social positions, where their knowledge is unnecessary. Acquiring knowledge is not a concern for many students in higher education (see Annex to Chapter 8 (A-8.1)).

The Attitude to School and Secondary Education

The foundations of society's intellectual wealth are laid at school, where the general attitude of children towards education, knowledge, and professions is formed. What is this attitude in Russia?

The general attitude of children towards their school studies is pragmatic. School education is considered mainly as the key to entering higher education, and many children define the value of the knowledge, which they acquire in school, in these terms. Children who are not interested in a high social status or are inclined to rely on their parents' support tend to treat education as unnecessary. Teachers recently polled by sociologists are very concerned about lack of interest in knowledge and the study process among their pupils (Box 8.2). Attitude of parents to their children's success in school is also pragmatic: many of

School education is considered mainly as the key to entering higher education, and many children define the value of the knowledge, which they acquire in school, in these terms.

Box 8.2.

Children's Attitude to School Education through the Eyes of Teachers

Teachers complained that they are unable to apply their knowledge and skills to the full extent in the present climate. Some of them believe that "the ideals of socialism and communism have been forgotten in the recent five to ten years" and "the capitalist idol is a not a suitable ideal". Children have got worse at relating to one another and playing together, and school-leavers "have certificates but lack knowledge". Teachers say that senior pupils have become more pragmatic than earlier... attaching much importance to individualistic values: their own well-being, personal success, money (children are alarmingly ready to use any means to obtain it). Illegal or immoral paths to success are not condemned and sometimes even applauded."

Source: E.I. Pronina, Rol' osnovnykh agentov sotsializatsii v formirovanii tsennostey molodezhi i podrostkov v sovremennoy Rossii (The Role of Main Factors of Socialisation in the Formation of Youth and Adolescent Values in Contemporary Russia) in D.L. Konstantinovsky, L.P. Verevkin (ed.), O*brazovanie i nauka v protsesse reform: Sotsiologichesky analiz (Education and Science in the Course of Reforms: Sociological Analysis)*. TsSP Publishers, Moscow, 2003, p. 275 (in Russian).

The primary explanation given by teachers for lack of interest in study and knowledge acquisition among schoolchildren is weakening of the social prestige of knowledge and education ("money is the central issue now, and children see and understand this"). Another reason is that paid education is accessible to children of well-off parents and not to the most gifted and diligent pupils, and that, in Russia's semi-criminal economy, well-off parents tend not to belong to the most educated social stratum... In the opinion of teachers, schoolchildren lack stimuli to work hard in school because: (1) well-off parents can pay for their children's admission to higher education; (2) if the parents are poor, their children have no chances of entering higher education in any case; (3) one can earn a lot of money without knowledge or education (this opinion is common to children in both well-off and poorer families). Thus, both wealth and its absence make it unnecessary to gain knowledge by one's own efforts... Many pupils consider school as a road to higher education, although more and more of them come to the conclusion that the main factor is not quality of knowledge obtained in school but relative wealth of parents, which will enable them to pay for their children's further education, undermining motivation to obtain high-quality knowledge in school.
Other teacher quotes are as follows: "We are not satisfied with the quality of knowledge, which schoolchildren obtain, but the problem is in the family rather than in school. Parents fail to supervise their children, belittle the role of teachers and of knowledge, and state openly that money governs everything. If that is the case, there is no reason to work hard at school if one has money, and even less reason if one has none. Children readily accept this attitude and lose interest in education." "Interest in knowledge is declining, because money has become the decisive factor in access to higher education."

Source: Z.T. Golenkova (ed.), *Sotsial'naya stratifikatsiya rossiyskogo obshchestva (Social Stratification of the Russian Society)*. Letny Sad Publishers, Moscow, 2003, pp. 208-209, 220-221 (in Russian).

A major factor weakening children's eagerness to learn is current low social status of teachers, which proves convincingly that knowledge as such does not ensure success in life, as commonly understood

them do not stimulate their children to gain knowledge, consider secondary school education only as a stepping stone towards a career, and undermine any enthusiasm, which their children might have for study, by readiness to pay cash for their higher education, as described above. Parents, who were asked in 1997-2000 which subjects they want their children to concentrate on, picked out computer literacy, information science, foreign languages, mathematics, Russian language, and literature, i.e., the subjects included in entrance examinations to higher education establishments (parents can save money on coaching fees if their children are good at these subjects).[6]

A major factor weakening children's eagerness to learn is current low social status of teachers, which proves convincingly that knowledge as such does not ensure success in life, as commonly understood see Annex to Chapter 8 (A-8.2).

The quality of secondary education depends on the attitude of children, parents, teachers, and the state towards school, and it is generally assessed as poor. Teachers are very sceptical about the knowledge, which their pupils are acquiring at school. In their view, children's lack of interest in study, knowledge, and serious reading, combined with general indifference of society and the state towards schools and the educated classes are damaging knowledge levels in schools, and overall cultural and literacy levels in Russia, so that intellectual development as such "recedes into the background".[7] Nine out of ten teachers polled in Perm Region admitted that children who were planning to enter higher education establishments needed extra preparatory coaching.[8] Parents of senior pupils were also sceptical about their children's preparedness, as witnessed by readiness to pay for coaching ahead of entrance examinations. Students of higher and specialized secondary education establishments were very critical of their school grounding as inadequate to help them master their new specializations. Teachers of higher education establishments supported this assessment: only 6.9% of them judged that preparation of students in senior classes of secondary schools was at a "high" level, 57.6% called the level "average", and 35.5% called it "poor". In the Perm poll, 49% of teachers of higher education establishments considered their students' school training to be unsatisfactory.[9] They explained this by a mismatch between curricula of schools and higher education establishments and, to a large extent, by the attitudes towards school education, which we described above.

Table 8.2.

How school leavers assess social significance, prestige, and earning potential of various occupations (scale 0 to 10 and ranking)

Occupation	Social significance		Prestige		Earning potential	
	Ranking	Points	Ranking	Points	Ranking	Points
Financier, economic planner	4	7.5	2	8.4	1–2	8.8
Lawyer	2	7.7	1	8.6	1–2	8.8
Engineer, industrial designer	6	6.7	5–6	6.1	5	6.3
Designer, stylist	9	6.1	3	7.7	3	7.9
Scientist	3	7.6	5–6	6.1	6	5.4
Physician	1	8.1	7	5.8	9	4.5
Teacher in higher education	5	7.0	8	5.5	7	4.9
Military officer	8	6.3	9	5.1	8	4.7
Manager	7	6.4	4	7.4	4	7.5
Farmer	10	5.1	10	3.3	10	4.3

Source: F.E. Sheregi et al., Nauchno—pedagogichesky potentsial i eksport obrazovatel'nykh uslug rossiyskikh vuzov (sotsiologichesky analiz) (Academic and Pedagogical Potential of Russian Higher Education Establishments and Export of Educational Services (Sociological Analysis)). TsSP Publishers, Moscow, 2002, p. 258.

Educational and Employment Aspirations after School

Senior pupils of secondary school have to choose between two "life trajectories": one of them leads directly to the labour market and the other leads to higher, specialized secondary education establishments, or vocational schools. Rural schoolchildren have steadily lost interest in continuing their studies due to awareness of the poor chances, which they have. of improving their social status: whereas in the early 1990s up to 60% of rural schoolchildren entered specialized secondary and higher education establishments (mainly returning to their villages after graduation), only 10-15% of them now intend to continue their education.[10] Urban pupils are much more eager to enter higher education.

Schoolchildren choose a higher education establishment and plan their future based on assessment of their chances for social advancement, and on family wealth, connections in high places, etc., which could be decisive factors in that advancement. Senior pupils of secondary schools provide the main input to higher education, but students of specialized secondary education establishments and vocational schools are also increasingly interested in continuing their education. A poll carried out in Novosibirsk Region in 2001 showed that 75.5% of senior students at specialized secondary education establishments and 52.7% of those at vocational schools intended to enter higher education; the poll also showed that 40.6% of students of specialized secondary education establishments and 31.5% of vocational school students did indeed enter higher education. Most of these young people combined work with study, but 66.7% of those who graduated from specialized secondary education establishments and 31.5% of former students of vocational schools considered their studies to be more important than their work.[11] They treated higher education as a means of enhancing their competitiveness, improving their chances on the labour market, and improving their living standards. The poll showed that the dominant aim of this life strategy is "improvement of social status and chances of a successful career", and use of all available

Young people treated higher education as a means of enhancing their competitiveness, improving their chances on the labour market, and improving their living standards

Table 8.3.

"Boys want to be businessmen, girls want to be models"

Respondents were asked what occupations are most attractive to boys and girls today. The results suggest that Russian society believes in the following hierarchy of preferences among its youth.

Boys	Ranking	Girls
Entrepreneur, businessman	1	Model
Lawyer	2	Economic planner
Economic planner	3	Lawyer
Banker, financier	4	Rich man's wife
Bandit	5	Accountant
"New Russian" (rich person)	6	Physician
Manager	7	Entrepreneur, business-woman
Programmer, computer specialist	8	Teacher
Military officer	9	Trade employee
Militiaman	10	Prostitute
Director, boss	11	Manager
Driver	12	Actress

Public Opinion Foundation. All-Russian poll of the urban and rural population. 15th June 2002. 1500 respondents.
Source: http://bd.fom.ru/report/cat/humdrum/work/of022204.

resources, including payment for education, is considered as justified for this end. It is instructive to look at employment preferences of young people leaving secondary schools, specialized secondary education and vocational schools. Polls carried out in different periods, in different places, and with different samples show identical priorities. Industrial and agricultural work, services, and production and reproduction of knowledge are, as a rule, not among the most attractive occupations. Top places in the hierarchy of preferences are occupied by lawyer, economic planner, accountant, manager, businessman, or designer (Tables 8.2, 8.3)

Students focus on the importance of higher education for career purposes, so that acquisition of knowledge and skills is pushed into second place (and often into third place behind avoidance of military service)

Aspiration to obtain higher education is tied up with aspiration to achieve these prestigious jobs and social roles, which are regularly identified with a high social status, since many of them require a prestigious diploma.

In choosing a higher education establishment, young people consider what their families can afford (including their ability to pay transport expenses if the establishment is far from where they live), useful connections, the number of other candidates, and their own level of preparedness. If these criteria can be satisfied for several institutions, the choice between them depends on preferences of the entrant and his or her parents, but the criteria are often decisive for the choice, making young people sacrifice their personal preferences. This is especially true for boys, who risk being conscripted for military service if they fail to become students. The main factors dictating the choice are often proximity, a low number of candidates, and absence of fees. In cases where a student can afford to pay fees, ease of entry is often the key attraction.

School leavers, who have chosen a higher education establishment against their own personal inclinations or without any serious intention to use the specialized knowledge, which the establishment offers, in their subsequent career are less likely to be seriously disposed towards study.

Attitude of Students towards Higher Education

Higher education establishments are the places where the scholarly and scientific knowledge of a society is transferred from one generation to the next, and society's intellectual potential depends on success of this process. It is most successful when students have strong subjective motives for acquiring knowledge. Is this true for young people in Russia?

Polls show that students tend to subordinate higher education to what they view as their key goal, i.e., improving their social status and making a career. Students focus on the importance of higher education for career purposes, so that acquisition of knowledge and skills is pushed into second place (and often into third place behind avoidance of military service). Students who are attending a particular institution due to their own inclination will be keen to acquire the knowledge and skills on offer, but this is unlikely to be true when the main point is to get a diploma, to avoid military service, or simply to postpone the difficult issue of employment for a time. Many students have no intention of working in the spheres, for which they are trained. A poll carried out in Moscow in 2001 showed that only 60% of respondents intended to find employment in their field of specialization,

10% planned to work in other fields, and 29% were uncertain of their plans.[12] Students sometimes misjudge the situation on the labour market and are unable to find a job in their field after graduation, so that a student who is devoted to the profession, which he has chosen, and makes great efforts to master it might be unable to apply his knowledge after graduation. So it is at least understandable why a young person might soberly and cynically conclude that knowledge as such does not guarantee success in life, and is reluctant to waste his efforts and time in acquiring it.

The attitude of students to their studies is a direct result of the predominantly utilitarian approach to education in general. Fourth-year students at higher-education establishments, polled in 2001, proved reluctant to work hard for a diploma that did not guarantee privileged social positions. Only 17.3% of the respondents were ready to inconvenience themselves for the sake of gaining knowledge, and 81.3% judged that any such inconvenience was unnecessary. Statistical data show that leisure, consumption, and earning money attract students more than study. Lower knowledge quality of graduates is a direct result of this .[13]

By reducing the amount of effort he devotes to study, a student leaves himself more time to seek an appropriate job. Combination of study with work is now common. This impairs educational standards, but fits the overall value system of students: there is no point in studying hard, if it interferes with finding a well-paid job or career.

The hierarchy of modern Russian student values makes a diploma more important than knowledge, and a lucrative job more important than a diploma. This attitude is an obstacle to successful reproduction of intellectual capital in Russian society.

Research and teaching hold little attraction for students. Although 27% of students planned to defend candidate dissertations, only 22% of the would-be candidates (6% of all students in higher education) plan to do academic research and 14% (4% of the total) plan to become teachers at higher education establishments. In other words, only a third of would-be candidates of science intend to work in the field, for which their education is preparing them.[14] Science and education, which are both crucial for society in the 21st century, both face an acute deficit of highly skilled specialists.

Education System and Labour Market

Knowledge-based development is impossible unless the education system trains a sufficient number of highly skilled specialists for strategically important sectors of the economy and unless the labour market can take them

Knowledge-based development is impossible unless the education system trains a sufficient number of highly skilled specialists for strategically important sectors of the economy and unless the labour market can take them. In the 1990s, serious disproportions developed in demand for various professions, and processes in Russian education and on the labour market are making it difficult to overcome them.

Reduction of state support and pressure of the market led to substantial changes in the education system, particularly in higher education. Increased demand for higher education diplomas and for the exemption from military service, which higher education offers, led to an increase in the number of higher education establishments. (These questions are also dealt with in Chapter 5.) Their number almost doubled (from 535 to 1006) in 1992-2001 and most of the new establishments were private. Meanwhile, Soviet-era establishments began to open numerous new branches. As a result, the number of students increased from 2,638,000 in 1992 to 5,426,900 in 2001. The average number of students (including evening and extramural students) per establishment was 2466 in 1992 and 3356 in 2001. Interest of establishments in fee-paying students created incentives to prevent them from dropping out. Old establishments attracted students by offering courses in professions that were in high demand and increasing admission to such courses. New private establishments also preferred to train students in "prestigious" professions: the share of private colleges in the number of students trained in economy was 50.9%, in law 43.9%, in management 49.1%, in psychology, computer science, and accounting 17.5%, and in marketing 10.5%.[15] Belief among young people that degrees in these professions would ensure lucrative jobs, and sensitivity of the education system to market demands, had led to overproduction of specialists in these fields.

The other side of this coin is a shortage of specialists in "non-prestigious" fields.

Another current trend is reduction of demand for graduates, who are just out of higher education establishments: employers increasingly prefer applicants with work experience. This is particularly true in the "prestigious" professions.

The shortage of experts in sciences, technology, and engineering is not only due to lack of graduates in these professions, but also to impaired quality of their training and their reluctance to work in the spheres, for which they were trained. Some estimates suggest that up to half of all young people with higher education do not use their training in their jobs. About half of former students of teacher training and medical training establishments do not work as teachers or doctors. This corresponds to the system of preferences in choosing a job: to Russians, a good job is, first and foremost, a well-paid job. The criteria for a "good job" are: high salary (58% of respondents); suiting one's inclinations and abilities (36%); opportunities to improve skills and making a career (11%); good relations with colleagues and bosses (10%); labour conditions (4%), etc. [16] Many sectors, which produce goods and services, that are crucial for the well-being of society, are unattractive for young people with higher education. and many young people, who have entered these sectors, are disappointed with their choice. In many cases, their choice lacked any positive motivation except absence of opportunities for anything "better" and relative ease of obtaining jobs in these under-subscribed sectors.

Some estimates suggest that up to half of all young people with higher education do not use their training in their jobs

The situation is complicated by underdevelopment of the labour market: a young specialist may want to apply his knowledge but fails to find an appropriate job, while an employer who has a vacancy may be unable to fill it. Owing to limited territorial mobility, it often happens that there are vacancies for, e.g., psychologists in one region and nobody to fill them, while in another region job seekers with a training in psychology cannot find employment in their field.

This leads to a waste of the intellectual capital created by higher education establishments. For want of other ways of finding employment, people rely on their relatives and friends. In the late 1990s, half of new graduates resorted to this method, often finding a job that did not correspond to their education.

This results in almost complete disorientation of school leavers, who have no clear idea of market demand for specialists in certain spheres, rely on vague opinions about prestige, choose the wrong profession, meet with disappointment, and join the ranks of specialists whom society does not need, forced to seek a job unconnected to what they have been trained for.

Unattractiveness of Academic Careers

Reproduction of a society's academic potential depends on enough people wanting to pursue an academic career. One measure of this is the number of graduates who want to pursue their studies by defending candidate and then, possibly, doctoral dissertations. Statistics paint an apparently rosy picture. The number of postgraduate students increased from 51,915 in 1992 to 117,714 in 2000 (by 2.3 times). Two thirds of candidate students started postgraduate studies immediately after graduation.

However, analysis of motivations shows that by no means all of these students want to devote their lives to science. Only half of postgraduate students intended to do research after defending their dissertations. Other main motives to take postgraduate courses include avoiding military service and improving one's employment chances by obtaining a candidate of science diploma. The careerist motivation is most manifest in such spheres as economy, law, political science, and medicine. A candidate diploma in the science and technology fields has much less of a role in career and salary success, and motivation to do research is more manifest among postgraduate students in these fields. However, science and technology postgraduate places are under-subscribed: in 1999-2001, 63.3% of applicants were admitted to postgraduate sciences courses without competition; in technology this share was 40.7%; and in agriculture it was 91.2%.[17] Lack of competition increases attractiveness of postgraduate studies as a way of postponing the employment question and avoiding military service.

Reproduction of a society's academic potential depends on enough people wanting to pursue an academic career

Lack of motivation for serious research among postgraduate students and break-

down of the link between postgraduate activity and continuity in science is evident from the fact that only 31.5% of postgraduate students at higher education establishments and 22.9% of those of at research institutes defend their dissertations on time.[18]

Orientation to an academic career declines further at the end of postgraduate studies. In 2002, only 17.9% of those who completed postgraduate studies planned to become researchers. This is mainly due to low salary levels among researchers. A third of all those who defend dissertations do not know what they will do next, but are reluctant to become researchers.[19] An academic career holds few attractions for young people, and current conditions discourage those who embark on this path. The result has been steady rise in the average age of teachers and researchers.

Another significant trend is weakening of the connection between conferment of candidate and doctoral degrees and research as such. An increasing number of dissertations are defended by people who have nothing to do with research and use their degrees to enhance their "weight" as public figures (in 2001, a third of dissertations were defended by politicians, businessmen, officials, and other non-academics). It is also the case that managerial positions in academic institutions are increasingly more attractive than research and teaching positions, which creates artificial demand for postgraduate degrees, since they are necessary for entitlement to such positions. The number of doctors of science at higher education establishments doubled between 1992 and 2001. These developments have lowered the overall quality of dissertations. Experts say that dissertation quality is mediocre, and that many dissertations are incompetent or written to order (not by the postgraduate student himself) [20]. This is demoralizing for those who genuinely want to work in research and teaching institutions.

Society's Attitude to Science

Russian science is currently in a state of crisis and its future prospects are vague (Box 8.3). This is due to objective difficulties, but also to indifference on the part of society.

Box 8.3.

Assessing the Outlook for Russian Science

Half of our respondents (an all-Russian representative sample of 1100 people) agreed that Russian science needs some form of protection. However, it is not considered as the top priority, lagging far behind health care, social security, education, and environmental protection, which also need state support.

Those questioned in a poll of experts (representatives of legislative and executive power, heads of state-run industrial concerns and trusts, and private businessmen, with 80 people in each group) were aware of the difficulties experienced by Russian science and were pessimistic about its future. Research and intellectual activity are not receiving either material or moral support from the state or the general public in Russia.

Source: V.A. Mansurov, L.A. Semenova, "Nekotorye tendetsii v razvitii professional'nykh grupp rossiyskoy intelligentsii" (Some Trends in the Development of Professional Groups among the Russian Intelligentsia) in V.A. Yadov (ed.), Rossiya: transformiruyushcheesya obshchestvo (Russia: a Transforming Society). KANON-press-Ts Publishers, Moscow, 2001, p. 299 (in Russian).

Russian science is currently in a state of crisis and its future prospects are vague

Academic employment is not prestigious in Russia today. There is a shortage of people willing to carry out serious research, and near absence of interest from society at large. It is very difficult to publish research results; popular-science literature has dwindled; radio and TV programmes and articles in the press about science are rare. Few people outside the academic world take an interest in science. This has left society vulnerable to various forms of pseudo-science and intellectual fraud. The borderline between science and irrational doctrines is increasingly vague in social consciousness (Box 8.4). In excuse of society's attitude, it should be pointed out that economic transformation has put most Russians face to face with more pressing problems than preservation of academic potential in their country. But the indiffer-

Box 8.4.

From a letter sent by Academicians E. Aleksandrov, V. Ginzburg, E. Kruglikov, and V. Fortov to Izvestia newspaper.

"We have learned that the Cultural Centre of the Russian Armed Forces runs a "Centre of Scientific Astrology!" It is difficult to imagine a more monstrous mockery of common sense... We seem to be world leaders in this respect... A very deplorable trend can be observed in recent years, as the armed forces and law-and-order agencies have started to use the services of sorcerers, extrasensory perception adepts, and other "scientists", whom genuine science would not let past the door. Unfortunately, the Ministry of Defence is in the vanguard of this regress towards the Middle Ages."

Source: Izvestia, no. 197 (26514). 25th October, 2003, p. 5.

ence of society is bound to be highly demoralizing for the academic community. The academic community also senses indifference from the state. The official line is that science should receive support, but very little support is actually received. Budget funding of science has consisted of leftovers from other spending items. This has thwarted serious research at academic establishments, which have been forced to spend available funds on salaries, payment for public services, repair of dilapidated buildings, etc. Research establishments cannot afford to maintain and renovate their resources (equipment, laboratories, test grounds, materials, reagents, etc.), which are becoming increasingly obsolete. And, as already explained, a researcher's salary is barely sufficient for the necessities of life.

Being unable to provide scientists and scholars with what they need to work efficiently, the state advises them to become self-sufficient. However, the Soviet system of relationships between science and production has been destroyed, export of raw materials has become the pillar of the Russian economy, and high-tech industries are in a state of depression. In these conditions business demand for R&D (not to mention fundamental research) is low, which makes self-financing of science impossible. Attempts by scientists to turn to applied research have weakened fundamental science and failed to solve financial problems.

So Russian scholars find themselves neglected by society, the state, and business. Young people see no reason to go into science, and many researchers, whose salaries are lower than those of a bus conductor or a supermarket till worker, quit science and education. The number of workers in science halved from 1992 to 2002. Many former scientists seek employment in business to maintain their families. Others find work abroad (it is estimated that between 250,000 and 500,000 researchers and specialists have emigrated). Russia has lost a huge amount of intellectual capital.

So Russian scholars find themselves neglected by society, the state, and business. Young people see no reason to go into science, and many researchers, whose salaries are lower than those of a bus conductor or a supermarket till worker, quit science and education

Low incomes and a depleted resource basis provide few incentives for serious research, and many specialists combine their scientific work with other work, to the detriment of research quality. Teachers at higher education establishments, who traditionally played an important part in fundamental and applied research, are now unable to do so for objective reasons or due to lack of time (research is not counted as part of their teaching load and is not paid). Many teachers have to work at several establishments and are overloaded with lecture duties. Russian libraries lack money to order new academic publications and periodicals. With their low salaries, most teachers cannot buy available books in science, and many of them have no access to the internet. Research activities and publications by teachers are often a mere formality, discharged due to the insistence of their superiors or as means of making a career. Most of the "scientific" publications offered at bookshops are textbooks and manuals, since their authorship is better paid than research publications, and is a necessary condition for attaining certain academic positions and defending a doctoral dissertation. The quality of many recent textbooks and manuals has been severely criticized.

Lack of motivation for scientific work and promulgation of "ersatz" research demoralizes specialists and impairs quality, leading to knowledge stagnation and causing Russian researchers to drop out of the international academic community. Of course, this is not true of all scholars. Many do their job conscientiously, but they do so in spite of the unfavourable environment. Their selfless devotion to science is the most important resource that Russian society has for knowledge-based development. But such development is impossible unless society starts to cherish this resource, and ensures that researchers obtain the material and informational support, which they need in order to do their job properly.

* * *

To sum up, the attitude of Russian society towards knowledge is dual. On the one hand, it places a high value on "having an education", since people see this a crucial to their status and career prospects. On the other hand, the status of knowledge as such, and of those who produce and reproduce it, is low. Although there is no overt anti-intellectualism in society, most Russians are reluctant to work in the sphere of knowledge transmission, since it does not match their life plans. They prefer to see others doing

this necessary but non-prestigious work. The burden of maintaining society's intellectual potential is borne by selfless "knowledge fanatics", who are ready to make personal sacrifices for the sake of science.

In this context, higher education establishments cannot ensure a sufficient inflow of new people to science, education, and the high-tech economy. The intellectual capital created in these establishments is not used properly, a sizable part of it is lost, and its quality deteriorates. The underdeveloped labour market means that many of those who are ready to dedicate themselves to knowledge, despite its low prestige, are unable to find an appropriate job and realize their aspirations. All this creates additional difficulties for Russia's knowledge-based development, and threaten a gradual erosion of the whole education and knowledge production system with all the consequences, which that entails.

Improved use of the available resources is the first thing, which is necessary for overcoming the negative trends described in this chapter. Education and science must become a priority for state investments. Much attention must be paid to increasing availability of resources and information to education and research establishments. Government strategy must aim to make intellectual professions, which ensure preservation and development of knowledge, more attractive by popularising them and gradually improving the living standards of those whose choose a career in these professions. A key way forward for such a policy is to create favourable conditions for charity support of science and education, by making such action advantageous for benefactors.

Improved use of the available resources is the first thing, which is necessary for overcoming the negative trends described in this chapter

[1] See D.L. Konstantinovsky, "Institut obrazovaniya i sotsial'noe neravenstvo" in V.A. Yadov (ed.), *Rossiya: transformiruyushcheesya obshchestvo*. KANON-press-Ts Publishers. Moscow, 2001, p. 157 (in Russian).

[2] All-Russian poll of the Public Opinion Foundation. Autumn 2002. Sample: 6694 households (2008 people). See: http://bd.fom.ru/report/cat/man/valuable/obr0301. According to other data (Monitoring.ru. Poll in 7 federal districts. May 2001. Sample: 1600 people), more than 70% of parents wanted their children to have higher education; among well-off urban inhabitants, this share reached 92%. See D.L. Konstantinovsky, L.P. Verevkin (ed.), Obrazovanie i nauka v protsesse reform: Sotsiologichesky analiz. TsSP Publishers, Moscow, 2003, p. 394 (in Russian).

[3] See http://bd.fom.ru/report/cat/man/valuable/obr0301.

[4] F.E. Sheregi *et al.,* Nauchno—pedagogichesky potentsial i eksport obrazovatel'nykh uslug rossiyskikh vuzov (sotsiologichesky analiz). TsSP Publishers, Moscow, 2002, pp. 296, 299 (in Russian).

[5] O.A. Androsova, "Tsennost' obrazovaniya i professii pedagoga v sisteme tsennostey rossiyskikh uchiteley" in *Obrazovanie i nauka v protsesse reform...,* p. 194 (in Russian).

[6] All-Russian poll of the All-Russian Central Institute of Public Opinion. May 2000. Sample: 1600 people. See: http://shkola.spb.ru/12-letka/index.phtml?cid=3&nid=3.

[7] O.A. Androsova, op. cit., p. 197.

[8] http://bd.fom.ru/report/cat/man/valuable/obr0301.

[9] F.E. Sheregi *et al.,* op. cit., p. 275–278; http://bd.fom.ru/report/cat/man/valuable/obr0301.

[10] V.A. Mansurov, L.A. Semenova, "Nekotorye tendetsii v razvitii professional'nykh grupp rossiyskoy intelligentsii" in V.A. Yadov (ed.), *Rossiya: transformiruyushcheesya obshchestvo,* p. 300 (in Russian).

[11] F.A. Khokhlushkina, "Zhiznennye strategii molodezhi Novosibirska posle polucheniya srednego i nachal'nogo professional'nogo obrazovaniya" in *Obrazovanie i nauka v protsesse reform...,* pp. 115, 119 (in Russian); idem, "Rabota i ucheba kak sposoby professional'noy samorealizatsii vypusknikov nachal'nykh i srednikh professional'nykh uchebnykh zavedeny" in ibid., pp. 150-151 (in Russian).

[12] F.A. Khokhlushkina F.A., "Rabota i ucheba...", p. 155; E.D. Voznesenskaya, G.A. Cherednichenko, "Sotsial'naya mobil'nost' i obrazovatel'nye traektorii molodezhi so srednim obrazovaniem" in ibid., pp. 73—74, 77—79 (in Russian); Z.T. Golenkova (ed.), Sotsial'naya stratifikatsiya rossiyskogo obshchestva. Letny Sad Publishers, Moscow, 2003, p. 258 (in Russian).

[13] D.L. Konstantinovsky, "Molodezh' i obrazovanie mezhdu svobodoy vybora i neobkhodimost'yu" in *Obrazovanie i nauka v protsesse reform...,* pp. 26-27 (in Russian).

[14] F.E. Sheregi *et al.,* op. cit., p. 311.

[15] Ibid., pp. 290, 292, 291, 294.

[16] Public Opinion Foundation. All-Russian poll of urban and rural population. 28th December 2002. Sample: 1500 people. See: http://bd.fom.ru/report/cat/humdrum/work/of030306.

[17] F.E. Sheregi *et al.,* op. cit., p. 341.

[18] Ibid., p. 324.

[19] S.B. Zaitsev, "Aspiranty o problemakh v sisteme podgotovki kadrov vusshey kvalifikatsii" in *Obrazovanie i nauka v protsesse reform...,* pp. 358, 359, 364 (in Russian).

[20] F.E. Sheregi *et al.,* op. cit., pp. 128, 220, 329—330, 355—365.

Annexes

Annex to Introduction (A-I)

Calculating Knowledge-Economy Indexes

The World Bank's K4D program offers two aggregate indexes — the Knowledge Economy Index (KEI) and the Index of Knowledge (IK). The Knowledge Economy Index is an average of four indexes - the Index of Economic Incentive and Institutional Regime, the Index of Education and Human Resources, the Innovation Index and the Index of Information Technologies and Communications (Information Infrastructure Index). The Index of Knowledge is an average value of only three of them - the Index of Education, the Innovation Index and the Information Infrastructure Index. Each of these indexes is the arithmetic mean of normalized data for relevant indicators. The indexes are calculated for each country, for groups of countries and for the whole world.

Data are normalized in the following way. First, data for a particular indicator are collected for all countries (121 in all) and the countries are ranked from 1 to 121 according to this indicator. Then the number of countries below a given country in the ranking are counted (Nw) and Nw is compared with the total number of countries (Nc), using the following formula:

$$\text{Normalized indicator} = 10x(Nw/Nc)$$

The normalized indicator has a value between 0 and 10. The country with the best indicator takes a value of 10 and the country with the worst indicator takes a value of 0. So the 10% of countries with the best indicators take values between 9 and 10, the second 10% take values from 8 to 9, and so on. The normalized indicator thus reflects the position of any given country compared with other countries, measured by that indicator.

A look at indicator data for two countries — Russia and the USA — in 1995 and the early 2000s (cf. Table 1) shows that levels of the UNDP's Human Development Index have remained unchanged for both countries in recent years. However, most countries have seen a definite rise in this Index over the same time, so that normalized human development indicators for both Russia and the USA have dropped.

Table 1

Basic Knowledge-Economy Indicators, Russia and the USA

Index	USA (latest data) absolute/normalized (all countries)	USA (1995) absolute/normalized (all countries)	Russia (latest data) absolute/normalized (all countries)	Russia (1995) absolute/normalized (all countries)
Average GDP growth rate (%)	3.00/4.21	3.50/4.92	3.80/5.95	–5.60/0.25
Human Development Index	0.94/9.33	0.93/9.50	0.78/5.67	0.78/6.30
Tariff and non-tariff barriers	8.00/6.25	8.00/6.83	4.00/2.08	4.00/3.25
Regulatory quality	1.51/8.60	1.31/9.34	–0.30/3.39	–0.41/2.23
Rule of law	1.70/8.60	1.70/8.83	–0.78/1.82	–0.80/0.92
Researchers in R&D/mln. people	4102.89/9.43	3636.00/9.44	3479.35/8.98	3794.00/9.67
Scientific and technical journal articles /mln. people	586.80/9.08	676.17/9.25	106.99/7.08	124.96/7.42
Patents granted by USPTO/mln. people	345.81/9.91	243.62/9.91	1.65/6.64	99.40/7.85
Adult literacy rate (percentage of population aged 15 and above)	100.00/8.18	100.00/8.43	99.60/7.52	87.00/6.86
Secondary enrolment rate	95.16/7.36	97.40/7.93	83.33/5.62	42.00/8.26
Tertiary enrolment rate	72.62/9.75	80.90/9.83	64.09/9.42	42.00/8.26
Telephones (fixed and mobile) per 1000 population	1147.00/7.60	736.00/9.59	362.70/5.29	170.00/6.20
Computers per 1000 population	625.00/9.91	328.09/9.82	88.70/6.09	17.57/5.40
Internet users per 10,000 population	5375.06/9.59	755.00/9.75	409.32/4.38	15.00/5.95

Table 2

Knowledge Economy Index and its Components for Countries of Europe and Central Asia

Country	KEI	Economic Incentive and Institutional Regime	Innovation System	Education and Human Resource	Information Infrastructure	KEI 1995	Economic Incentive and Institutional Regime 1995	Innovation System 1995	Education and Human Resources 1995	Information Infrastructure 1995
Estonia	7.70	8.18	7.03	7.74	7.84	7.73	7.98	7.25	7.82	7.88
Czech Republic	6.80	6.10	6.76	7.07	7.28	7.06	8.06	5.88	7.02	7.29
Lithuania	6.67	6.55	6.56	7.68	5.90	5.67	4.40	5.71	6.97	5.58
Russia	5.69	2.43	7.57	7.52	5.25	5.87	2.13	7.84	7.66	5.85
Europe and Central Asia	5.27	4.03	5.51	6.56	5.00	5.23	3.81	5.42	6.59	5.10
Ukraine	4.92	2.49	6.03	7.82	3.33	5.02	1.08	6.49	7.71	4.80
Georgia	4.54	2.66	5.76	6.19	3.57	4.78	2.44	6.36	6.86	3.47
Turkey	4.47	4.61	4.32	3.40	5.53	4.91	5.96	4.07	4.08	5.53
Moldova	3.79	3.76	2.82	5.52	3.05	3.73	2.71	3.38	6.47	2.36

In the modern world, like «Alice in Wonderland», you have to run to stand still and run even faster to move forwards.

Indicators of tariff and non-tariff barriers to foreign trade show an analogous result. The normalized indicator for Russia has dropped from 3.25 to 2.08 since 1995. However, normalized indicators of quality of state regulation and rule of law have improved, although remaining at a comparatively low level. In 1995, Russia was among the worst 10% percent of countries for rule of law, but it had moved up to the second-lowest decile group by 2000.

Russia is on a level with the US measured by the number of R&D researchers per million population, but there is a declining trend. Development of the crucial indicator of secondary education looks alarming, with a fall in both absolute and relative terms. Once a leader for levels of enrolment in secondary education, Russia had dropped back to the middle of the field by 2000. On the other hand, Russia is still a leader for tertiary enrolment.

Indicators for technical standards of information and communication technologies are of great interest. Despite strong growth in the number of telephone sets per 1000 population, Russia has been overtaken by some other countries. The country has improved its showing by normalized indicators of computerization, but lost ground in normalized indicators of Internet user numbers per 10,000 population despite absolute growth from 15 to 409.

The international statistics tradition puts Russia in the «Europe and Central Asia» group of 22 countries: Albania, Armenia, Belarus, Bulgaria, Czech Rep., Estonia, Hungary, Georgia. Kazakhstan, Kirghiz Rep., Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Rep., Slovenia, Tajikistan, Turkey, Ukraine, and Uzbekistan. Normalized indicators for this group of countries offer a useful research tool.

The indicators in Table 2 show that Russia is above average among these countries in terms of the KEI. Russia is also ahead of its neighbors in the Index of Education and Human Resources (7.52 for Russia and 6.56 for the whole group of countries) and the Innovation System Index (7.57 and 5.51, respectively). However, Russia lags far behind its neighbors in Europe and Central Asia for Economic and Institutional Regime (2.43 for Russia and 4.03 for the whole group).

Table 3 brings out weak points in Russia's economic incentive and institutional regime. Main weaknesses are insignificant role of the banking system in the economy, poor protection of intellec-

Table 3

Indicators of the Economy and Institutional Regime, USA and Russia

Index	USA absolute/normalized (all countries)	Russia absolute/normalized (all countries)
Gross capital formation as % of GDP (average)	18.50/2.40	24.20/7.02
General government budget balance as % of GDP	–2.50/4.96	1.70/9.39
Trade as % of GDP	26.20/0.17	53.90/2.07
Tariff and non-tariff barriers	8.00/6.25	4.00/2.08
Intellectual property is well protected	6.40/9.74	2.40/1.04
Soundness of banks	6.60/8.83	3.50/0.91
Adequate regulation and supervision of financial institutions	6.60/4.31	3.76/0.39
Intensity of local competition	6.10/9.87	4.40/1.82

tual property, inadequate regulation of financial institutions, and lack of competition at the local level. Russia trails most other countries by these indicators.

Table 4 shows that Russia is in the bottom third of countries measured by quality of state regulation, effectiveness of government, civil liberties, political rights and political stability. Russia does even worse as regards implementation of laws, control of corruption, and freedom of the press, ranking among the bottom 20% of countries.

Table 5 presents innovation indicators for the Russian economy, but only shows those indicators, by which Russia is far from the world average. These include level of foreign direct investment (FDI), cooperation between universities and private companies, administrative barriers to new business, and availability of venture capital.

In this table the indicator for FDI is based on average FDI from 1990 to 2000. The other three indicators are based on results of polls carried out for a report on competitiveness in various countries, prepared for the annual World Economic Forum.

Table 4

Indexes of State Governance for the USA and Russia

Index	USA absolute/normalized (all countries)	Russia absolute/normalized (all countries)
Regulatory framework	1.51/8.60	–0.30/1.82
Rule of law	1.70/8.60	–0.78/1.82
Government effectiveness	1.70/8.51	–0.40/3.55
Voice and accountability	1.32/8.51	–0.52/2.89
Political stability	0.34/5.21	–0.40/3.06
Control of corruption	1.77/8.60	–0.90/1.74
Press freedom	17.00/8.17	66.00/2.17

Table 5

Innovation

Index	Russia absolute/normalized (all countries)
FDI as % of GDP 1990—2000	1.50/2.83
Research collaboration between companies and universities	3.30/3.90
Administrative burden for start-ups	3.20/1.82
Availability of venture capital	2.60/2.73

Annex to Chapter 2 (A-2)

Таблица 1

Ratio Between the Shares of Value Added in Goods and Services Produced in the Key Sectors of the Knowledge Economy and in Industry as a Whole in Russia and the USA

Sector	Russia	USA
Industry as a whole	1	1
Science and scientific services	1.01	1.62[1]
Geology and mineral exploration, geodetic and hydrometeorological services	1.31	...
High-technology industries:		
defense industry	...	1.43
instrument making	1.32	1.38
aircraft industry	...	1.22
machine-tool industry	...	1.45
pharmaceutical industry	...	1.35
Telecommunications	1.47	1.34
Education	1.58	1.30
Healthcare	1.18	1.48
Culture and art	1.19	...
Finance and credit	1.29[2]	1.39
Administration	1.30	1.63
Insurance	...	1.04
Computer and information processing services	1.34	1.44

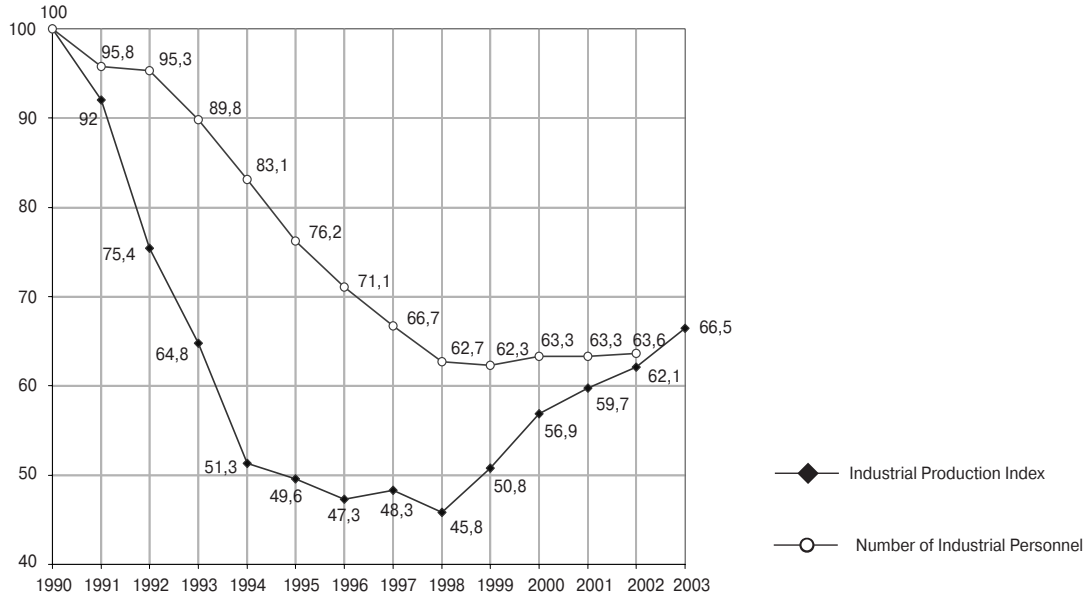
1. For engineering services in general, including R&D services.
2. Including insurance.

The figures for Russia were calculated using data from the intersectoral (input-output) balance of production and distribution of goods and services for 1995[a] and the system of national accounts for 1999—2000. The figures for the USA are based on data for 1998.[b]

[a] *Sistema tablits «zatraty-vypusk» za 1995 god* (System of Input-Output Tables for 1995), Moscow, State Statistics Committee, 1995.

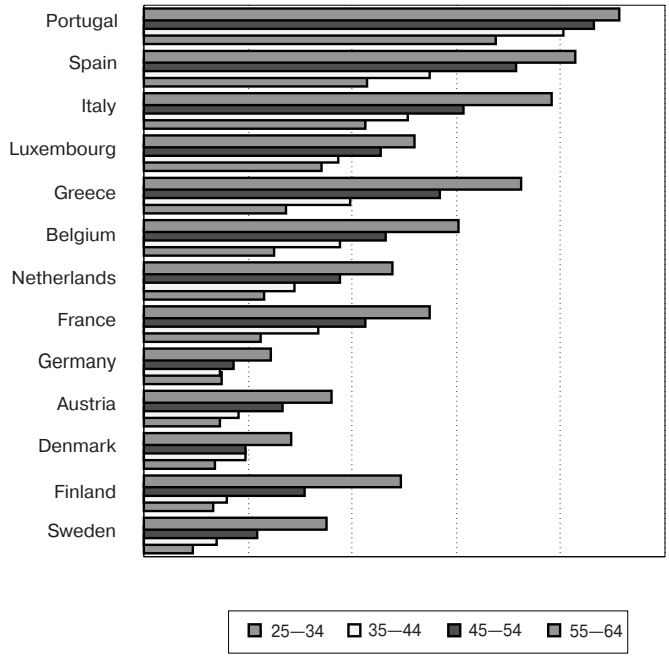
[b] M. Planting, P. Kuhbach, «Annual Input-Output Accounts of the US Economy, 1998», *Survey of Current Business,* December 2001.

Figure 1. **Industrial Production Index and Number of Industrial Personnel in Russia in 1990—2003**



Annex to Chapter 4 (A-4)

Diagram 1. **The share of people aged 25—64 in EU countries with education no higher than basic secondary (2001, %)**



Annexes to Chapter 5 (A-5)

Annex A -5.1.

The International Standard Classification of Education (ISCED) and the Education System in Russia

ISCED is a classification system enabling comparison of statistical data on education in selected countries as well as providing an international scale. The classification now in use, which is known as ISCED 1997, was approved by the General Conference of UNESCO at its 29th session in November 1997. ISCED-97 captures two classification variables: level of education and field of education.

The ISCED classification is uniform for all stages of professional education. In Russia, these consist of primary or

Table 1

Levels of Education According to ISCED 1997

Levels of Education Under ISCED-97	Equivalent in the Russian education system
ISCED 0 — PRE-SCHOOL EDUCATION. The first stage of organized instruction, mainly intended to prepare small children for schooling	Pre-school education.
ISCED 1 — PRIMARY EDUCATION. Usually intended to provide schoolchildren with basic knowledge in reading, writing and mathematics	Primary education.
ISCED 2 — LOWER LEVEL OF SECONDARY EDUCATION. On the whole, the lower level of secondary education continues basic programs of the primary level, although there is more instruction in individual disciplines, often requiring a more specialized teaching staff	General secondary education (9 years)
ISCED 3 — THE SENIOR LEVEL OF SECONDARY EDUCATION. The final stage of secondary education in most OECD countries. Instruction is more focused on individual subjects than at ISCED 2 and, as a rule, teachers have a higher level of training or qualification in individual subjects	
ISCED 3A — Programs are intended to prepare for subsequent instruction under ISCED 5A programs	Complete secondary education (11 years), whether completed in general secondary schools or other establishments
ISCED 3B — Programs to prepare for subsequent instruction under ISCED 5B programs	Lower professional education following general (9-year), secondary school, giving a diploma of complete (11-year) secondary education
	Medium professional education (medium special educational institutions) following (9-year) general secondary school
ISCED 3C — Programs not intended for a direct transition to ISCED 5A or 5B programs, but for direct access to the labor market, or instruction based on ISCED 4 or other ISCED 3 programs	Lower professional education, not leading to a complete secondary education diploma
ISCED 4 — POST-SECONDARY NON-TERTIARY EDUCATION. These programs are positioned on the border between senior secondary and post-secondary education, although in the framework of national education systems they might be placed in upper secondary or in post-secondary education. Usually, these programs are only a little more advanced than ISCED 3 programs and are intended to expand the knowledge of learners who already mastered ISCED 3 programs. As a rule, students are older than their counterparts at ISCED 3 level	Lower professional education following a complete secondary school course
ISCED 5 — THE FIRST STAGE OF TERTIARY (HIGHER) EDUCATION. In terms of content, programs of this level are more advanced than ISCED 3 and 4	
ISCED 5B — Programs are, on the whole, more practical (technical) and professionally-oriented than ISCED 5A programs	Medium professional education, following complete (11-year) secondary school
ISCED 5A — Programs are largely of a theoretical character, training learners for subsequent transition to ISCED 6 programs or for jobs, which require significant professional skills	Higher professional education (programs for bachelors and specialists)
ISCED 6 — THE SECOND STAGE OF TERTIARY EDUCATION. Tertiary education programs, which lead to obtaining an academic degree of Master or Doctor. They involve in-depth study of selected disciplines and independent research	Master's program, Candidate of science, Doctoral program.

Source: Teachers for Tomorrow's School. Analysis of World Education Indicators. Paris: OECD, 2001, Annex A5b, p. 220.
A.V. Poletayev, M.L. Agranovich, L.N. Zharova. Russia's Education in the Context of International Indicators. A Comparative Report. M., Aspekt Press, 2003, pp. 23—24 (in Russian).

lower special (professional) education, medium special (professional) education, higher pofessional education, and post-graduate education. ISCED-97 covers eight extensive, 25 narrower and nearly 80 detailed fields of education (each detailed field has a corresponding list of relevant programs).

The Russian system for classification of education is the National Education-Specialization Classifier (NESC), which was introduced 1993. NESC-93 uses two rather different systems of classification - on the one hand, a system covering MSEI training and training of «specialists» at HEIs (so-called «classification by specializations») and, on the one hand, a system covering bachelor and master of science programs at HEIs (so-called «training by directions»). NESC-93 includes nearly 250 items for MSEIs and upwards of 500 items for HEIs, which are spread across so-called «integrated groups of specializations», of which there are now more than 30. Unfortunately, these «integrated groups» use varied taxonomies and have an extremely heterogeneous degree of detail inherited from Soviet times and reflecting structures of a planned and militarized economy rather than a market system.

During the last few years the Russian Ministry of Education has tried repeatedly to update and improve the Classifier, including attempts to achieve conformity between specializations and directions. However, measures have been partial, and failed to deliver a proper solution of the problem. Some innovations, though justified in essence, have led to even greater complication. For instance, a third system of classification, called «directions of training of specialists», has been introduced, which mixes the classifications by specializations and by directions.

There is also the classification of degrees and qualifications conferred upon students who successfully graduate from educational establishments. And finally, there is a different classification system for post-graduate education — the National Classier of Specializations for Higher Scientific Qualification (NCSHSQ-93), — which has also inherited the principles of an early Soviet Classifier.

Annex A -5.2.

International Comparisons of Tertiary Education Indicators in G-8 Countries

Table 1

Students by Education Levels and Types of Educational Institutions, 2001, in %

Countries	Tertiary education, Level 5B		Tertiary education, Levels 5A-6	
	State educational establishments	Non-state educational establishments	State educational establishments	Non-state educational establishments
Great Britain	–	100,0	–	100,0
Germany	64,3	35,7	100,0	–
Italy	63,5	36,5	93,6	6,4
Canada	100,0	–	100,0	–
Russia*	96,2	3,8	87,9	12,1
USA	92,6	7,4	68,9	31,1
France	73,0	27,0	88,6	11,4
Japan	9,5	90,5	27,5	72,5

* Data for 2002. For Level 5B the data cover all MSEIs, for Levels 5A-6 the data refer only to HEIs.
Source: OECD, Federal Service for State Statistics.

Table 2

Teaching Staff Characteristics by Tertiary Education Levels, 2000

Countries	Number of students per teacher*		Share of women in the total number of teachers, in %	
	Level 5B	Levels 5A-6	Level 5B	Levels 5A-6
Great Britain	17,6		33	
Germany	14,9	11,7	47	27
Italy	6,0	24,1	31	30
Canada	9,8		40	
Russia**	14,2	11,4	75	50
USA	9,5	14,8	49	38
France	16,2	18,6	33	
Japan	8,8	12,9	н. д.	

* In terms of full-time study/employment with full number of hours. ** 2001 data for state MSEIs and HEIs.
Source: OECD, Federal Service for State Statistics.

Annexes to Chapter 8 (A-8)

Annex A-8.1

Education as a determinant of success in life

The key to understanding what value people place on education is a correct assessment of its role in helping them to achieve their goals in life. Polls in Russia, which have tried to shed light on this issue, offer differing results, but add up to a consistent general picture.

According to data collected by the Institute of Sociology (part of the Russian Academy of Sciences), criteria for upward mobility underwent some substantial changes by the late 1990s in comparison with the Soviet era. The main change was that significance of family resources, good connections, and happy coincidence considerably increased and significance of a good education decreased (Table 1). Respondents believed that: «success in life has become less dependent on education, industry, and natural ability. These factors remain important, but less important than they were in the past. Their role cannot be viewed as decisive. The significance of such positive subjective qualities as honesty and abiding by the law is negligible» [1].

A study of the middle class in contemporary Russian society carried out by the Russian Independent Institute of Ethnic and Social Problems (1999) gave a similar picture. The leading success factors were «strong ability», «good education», «hard work», and «good connections». Comparing views in Russia and in the West on the factors, which are crucial for success, the authors noted that «*the Russian middle class attaches much more importance to factors, which depend on personal situation, and much less to education, labour, and social origin than Western Europeans*»[2] (see Table 2).

Similar trends were detected by polls among students in the late 1990s. «As part of a study of the value orientations of students at higher-education institutions (HEIs) in Moscow and CIS countries, we asked them about factors that determine success in life... The respondents were students of HEIs in CIS countries (1996, N = 1887), of Moscow State University (1996, N = 1075), and of the Moscow Aviation Institute (1997, N = 1036). The first and second places in the hierarchy of values were taken by 'good connections and help from influential people' and 'enterprise', while 'quality education' and 'a promising specialization' ranked fifth and sixth, respectively. The rating of 'luck, happy coincidence' was very high.» A 1995 study on the topic «The Moscow Student: Problems and Attitudes» showed that «quality education» took second place to «help from influential people» (see Table 3).[3]

Table 1

Criteria of advancement in the Soviet and market eras (seven-point scale)

	Soviet epoch	The late 1990s
Rich parents	4.57	6.65
Highly placed relatives	5.32	6.59
Good education	6.21	5.55
Good connections	5.76	6.71
Industry	6.10	5.25
Persistence	6.05	5.84
Readiness to take risks	4.55	6.05
Ambition	5.25	5.44
Natural ability	6.20	5.66
Living in the capital	3.59	4.60
Ethnicity	2.66	3.75
Connections abroad	2.68	5.45
Charm	5.23	5.57
Political views	5.37	3.61
Honesty	5.44	3.73
Abiding by the law	5.54	3.63
Independence	4.44	4.91
Luck	5.67	6.17

Table 2

Importance of good education for success in life, %

	West Germany	East Germany	Great Britain	Russia, middle class
Very important	88.3	91.0	74.2	57.1
Important	9.7	8.0	22.8	31.6
Not very important	1.2	0.6	2.4	8.9
Not important at all	0.7	0.3	0.7	1.3

Table 3

What determines success in life: distribution of student responses, %

1. Good connections, help from influential people	57.9
2. Quality education	43.4
3. Enterprise, resourcefulness	43.1
4. Natural talent, ability	37.5
5. Industry, conscientiousness	31.5
6. Promising specialization	24.7
7. Luck, happy coincidence	23.7
8. Ruthlessness	15.6
9. Material support from parents	10.0

* The sum exceeds 100%, because respondents can choose up to three answers.

Similar attitudes are observed outside Moscow. The results of a poll carried out among clients of the Voronezh Occupational Orientation Centre (1998—1999, N = 407) were as follows. «The respondents (mainly young people with specialized secondary and higher education) were asked to evaluate the relative importance for business activity of ten qualities. They attached primary importance to such personal qualities as affability and business flair, initiative, and enterprise. They also placed a high value on 'useful' connections and availability of initial capital. Good education and knowledge of economics were in the middle of the ranking, and 'a high level of professional ability' was placed last. The most probable reason of this poor rating for professional ability is that 64% of the respondents had higher or specialized secondary education, i.e., a profession, and 89% of them were unemployed (63% of them were aged under 30). They might have learned from their experience that professional knowledge did not help them to get a job.» [4]

Many sociologists see cause for alarm in the tendency to value connections higher than education and professionalism. Some of them believe that Russia is undergoing a «devaluation of professional knowledge» with a gamut of negative social implications: «Such individual qualities as education, cultural level, and professional skills are less important for getting a good job (and making one's career in general) than social connections and social connections of parents, i.e., belonging to a privileged circle.»[5] «It is clear that professional qualities cannot ensure success, unless supplemented by good contacts. Russian society has a clear-cut understanding of the laws of upwards mobility, according to which it is impossible to rise socially without useful connections and money, the latter often being a derivative of the former. Industry and mastery of professional skills, which are in demand, are secondary factors (not more than one in five respondents consider them as an indispensable condition of advancement and success). The situation where qualified people are not needed, or only needed if they have the necessary contacts, is distorting the chain that links education, skills, incomes, long-term-savings, and consumption standards... Education is not a guarantee of employment with prospects of promotion.» [6]

1 Z.T. Golenkova (ed.), *Sotsial'naya stratifikatsiya rossiyskogo obshchestva*. Letny Sad Publishers, Moscow, 2003, pp. 104—106 (in Russian).

2 M.K. Gorshkov et al. (ed.), Sredny klass v sovremennom rossiyskom obshchestve. ROSSPEN, RNISiNP Publishers, Moscow, 2000, pp. 219, 221, 222 (in Russian).

3 N.V. Dragileva, «K voprosu o sotsial'noy differentsiatsii v sfere vysshego obrazovaniya» in D.L. Konstantinovsky, L.P. Verevkin (ed.), *Obrazovanie i nauka v protsesse reform: Sotsiologichesky analiz*. TsSP Publishers, Moscow, 2003, pp. 227—228 (in Russian).

4 L.A. Semenova, «Rossiyskie uchitelya, problemy obrazovaniya i formirovanie professional'nogo potsentsiala strany v usloviyakh transformiruyushchegosya obshchestva» in ibid., p. 183 (in Russian).

5 Ibid., p. 184.

6 Sredny klass v sovremennom rossiyskom obshchestve, pp. 25—26 (in Russian).

Annex A-8.2

Living Conditions of School Teachers in Russian Society

Social status of school teachers has deteriorated significantly in the period of reforms. The teaching profession has declined from being a source of prestige, respect, and more or less acceptable living standards in Soviet times to being near to the bottom of the social ladder at present. Teaching children has become almost synonymous with poverty, low social status, lack of prestige, and severe labour conditions.

Most teachers assess their living standards as poor. Surveys of teachers' families in different regions showed that the share of those with high incomes varied from 3.5% to 4.5% of the total, those with average incomes were between 7% and 14%, while those with low incomes were between 75% and 85%. «Between 35% (Yekaterinburg) and 49% (Tula) of teachers barely make ends meet: 'We live from payday to payday and often have to borrow money — saving money is out of the question.' Only 39-45% of teachers' families have enough money for everyday expenses: 'it is difficult to buy clothes: we have to save or borrow money for them.'» Experiencing financial difficulties, school teachers have to «deny themselves and their families the necessities of life. They cannot afford to travel during the vacation (80—82%), and they cannot afford durable goods (41.4—54%), a satisfactory diet (32—49%), or improvement in housing conditions (30—44%). One in five teachers lacks money for medical treatment and medicines, books, the theatre, cinema, concerts, etc.» [1]

Many teachers have to work in severe conditions: salary payment is often delayed; school buildings are in an unsatisfactory condition (leaking roofs, etc.); there is an acute shortage of teacher manuals, textbooks, visual aids, equipment, etc. Some findings suggest that up to 80% of teachers accept teaching loads that are 1.5—2 times larger than the standard, either for additional payment or owing to shortage of teachers.[2]

The social status of teachers is judged to be low both by teachers themselves and by other social groups. As a polled teacher said: «instead of commanding due respect, teachers experience undue humiliation.»[3]

In this context, it is not surprising that the attitude of school teachers to their own profession is gradually changing. Although 80% of them say that they are satisfied with it, their attachment to teaching and to their schools is not very strong. Various polls suggest that 40—50% of them regret having become teachers and are ready to leave their schools and take another job. This was especially manifest among young respondents. [4]

Low prestige of school teaching leads to a deterioration of the general level of those who enter teacher training establishments and graduate to work in schools. It is also the case that many students at teacher training establishments do not actually intend to work as teachers — their aim is merely to obtain a higher education. In the autumn of 1999, there were more than 11,000 vacancies in Russian schools, including 5,400 for teachers of foreign languages, 1,200 for history teachers, and 1,100 for teachers of Russian language and literature.[5]

These positions are filled by people without proper teacher training and sometimes without any higher education (refugees, pensioners, retired military officers, students, technical college graduates, etc.). The average age of teachers is going up and their general professional level is going down. The decline of teaching standards occurs partly because low salaries, abnormally high work load, and need to find extra work outside school leaves teachers no time to improve (or even maintain) their professional and overall cultural levels.

[1] Z.T. Golenkova (ed.), *Sotsial'naya stratifikatsiya rossiyskogo obshchestva*. Letny Sad Publishers, Moscow, 2003, pp. 203—204 (in Russian). (Data from polls carried out in Tambov, Tula, and Kirov Regions, Nizhni Novgorod, Yekaterinburg, and Moscow in 1998—2002. The total number of polled teachers was 1443.)

[2] O.A. Androsova, «Tsennost' obrazovaniya i professii pedagoga v sisteme tsennostey rossiyskikh uchiteley» in D.L. Konstantinovsky, L.P. Verevkin (ed.), Obrazovanie i nauka v protsesse reform: Sotsiologichesky analiz. TsSP Publishers, Moscow, 2003, p. 199.

[3] V.A. Mansurov, L.A. Semenova, «Nekotorye tendetsii v razvitii professional'nykh grupp rossiyskoy intelligentsii» in V.A. Yadov (ed.), Rossiya: *transformiruyushcheesya obshchestvo*. KANON-press-Ts Publishers, Moscow, 2001, p. 297 (in Russian).

[4] O.A. Androsova, op. cit., pp 191, 198; *Sotsial'naya stratifikatsiya rossiyskogo obshchestva,* p. 219 (in Russian).

[5] Ibid., p. 199.

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