MINISTRY OF ECONOMY

DYNAMIC **POLAND 2020**

STRATEGY FOR **INNOVATION** AND EFFICIENCY OF THE **ECONOMY**

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Ministry of Economy

STRATEGY FOR INNOVATION AND EFFICIENCY OF THE ECONOMY

"Dynamic Poland 2020"

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Introduction

Eight year experience acquired during EU membership of Poland shows that the proper determining of the development objectives and ensuring their implementation do not depend solely on the available financial resources as it has been generally believed so far. Apart from financial resources, the management system in the public sector is an important, and in the long perspective even much more important, factor, that determines the development of the country. The way and the quality of system functioning as a whole and at different management levels determine, to a large extent, the country or region capacity (more specifically the capacity of political class and public institutions) to respond appropriately to the emerging strategic challenges.

In 2009, the Polish government presented the Assumptions of Polish development management system to increase the efficiency of programming and development policy implementation as well as to improve the quality of public institutions. The same year, the government also adopted the Development strategies arrangement plan based on these assumptions to reduce the number of strategic documents implementing medium- and long-term national development strategy to nine. These documents included the Strategy for Innovation and Efficiency of the Economy 'Dynamic Poland 2020' (hereinafter referred to as the 'Strategy') with the Minister of Economy appointed as coordinator[1]. Other documents in this group include: Human Capital Development Strategy (HCDS), Transport Development Strategy (TDS), Energy Security and the Environment Strategy, Efficient State Strategy (ESS), Social Capital Development Strategy (SCDS), National Strategy of Regional Development (NSRD) 2010–2020: regions, cities, rural areas, Strategy for Development of the National Security System, Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries. The arrangement plan has also determined the topics of the Strategy, which include the following issues: macroeconomic stability for development, financial market, entrepreneurship friendly environment, development of services, development of industrial and construction sectors, innovation, information society, export and economy promotion. The integrated framework is also laid down in the Act on Development Policy Making of 6 December 2006 (Dz. U. [Journal of Laws] of 2009, No 84, item 712, as amended).

[1] The Minister of Economy is also a coordinator of Energy Security and the Environment Strategy.

The Strategy... is closely linked to other national and EU strategic documents. These include: Long-term National Development Strategy (LTNDS), National Development Strategy 2020, Active Society, competitive economy, efficient state, National Spatial Development Concept 2030, National Cohesion Strategy, National Reform Programme (NRP), other integrated strategies and Europe 2020 strategy. Coherence of the Strategy with the objectives of particular framework strategies ensures the proper implementation of economic policy in achieving the planned vision. The national strategic documents are based on the Act on Development Policy Making of 6 December 2006 (Dz. U. [Journal of Laws] of 2009, No 84, item 712, as amended) which determines the layout, hierarchy (Article 9 and 14a of the Act), basic elements (Article 10, 12a, 13 and 14b) and implementation rules (Chapter 3 and 5 of the Act). According to its assumptions the Strategy will be implemented through the operational and development programmes, in particular Enterprise Development Programme.

Strategy for Innovation and Efficiency of the Economy directly falls under EU Europe 2020 strategy priority of smart, sustainable and inclusive growth. This coincides with the main objective of the Strategy. Actions covered by the Strategy... will also directly contribute to the implementation of the Europe 2020 strategy objectives, such as reaching the R&D investment level of 3% of GDP (for Poland 1.7%).

The structure of the Europe 2020 strategy is based on seven flagship initiatives of which Innovation Union is the closest to the Strategy. Its assumptions coincide with the Strategy .... objectives with regard to creation of knowledge-based economy through an increased scientific potential, development of an integrated research infrastructure, enhancement of the education level and e-skills, increase in the mobility of scientific staff or support for SMEs with high potential for development and commercialisation of inventions and innovation.

'European Digital Agenda' is another initiative which envisages sustainable economic and social benefits from the digital single market based on the fast Internet and interoperable applications. The strategic actions of Agenda reflect in the Strategy in the form of the use of ICT potentials by the citizens, enterprises and public services that will contribute to the innovation and economic growth, as well as to the improvement of everyday life quality.

Industrial policy for the globalisation era supports a strong, diversified and competitive industrial base in Europe which offers well-paid jobs. Modern industrial policy supports entrepreneurship, improves the competitiveness of industry and services, strives to maximise the benefits from the globalisation and creates environment friendly economy. The Strategy… also leads to an improved business environment (for example access to the capital), supports innovation, internationalization of Polish economy and transition to a 'greener path'.

Resource-efficient Europe flagship initiative aims to decouple economic growth from resource use through the transition to a low-carbon economy, increased use of renewable energy sources, transport modernisation and promotion of energy efficiency. The initiative assumptions are consistent with the Strategy... objectives in the area of making full use of ICT potential, development of sustainable production and consumption methods or supporting the sustainable construction.

Agenda for new skills and jobs provides jobseekers with opportunities to raise their skills and adjust them to the needs of enterprises. The EU is planning to launch the 'EU Skills Panorama' that will provide forecast of the skills most needed now and in the future, as well as will take actions to help the citizens develop appropriate skills and find job.

National Reform Programme is a government's medium-term planning document prepared for the implementation of the Europe 2020 strategy. NRP is a response to the most important global challenges and shows the way to build solid foundations for economic growth by combining the EU objectives and national priorities. The reforms programmed under the NRP make it possible to overcome the development barriers which inhibit national development potential. NRP is an element of the national development policy management system, and the reforms it proposes, in combination with long- and medium-term national development strategy and nine integrated national strategies under development, concentrate on the priority areas in terms of social and economic development of Poland, leading to implementation of the objectives of the Europe 2020 strategy.

Single Market Act adopted by the European Commission in May 2011 is a cross-cutting EU strategic document which is an attempt to create the most coherent internal market of the EU. *Single Market Act* may be perceived as the EU context of the actions envisaged in the Strategy .... with regard to simplifying tax regulations and limiting administrative and financial burdens, in particular for SMEs

and consumers, disseminating and protecting knowledge, international public-private partnership (PPP), standardisation etc.

Small Business Act adopted in 2008 is another document of similar nature. Its assumptions were used as a basis for the majority of Strategy actions relating to small and medium-sized enterprises: creating favourable conditions for entrepreneurship, developing financing for SMEs, adjusting public policy instruments to the SMEs needs, increasing their share in public procurement and international trade, as well as providing support for raising skills of SMEs and all forms of innovation.

EU Sustainable Development Strategy adopted in 2001 in Goteborg and renewed in 2006 is the EU strategic document in the area of sustainable development. The document is oriented towards achievement of long-term objectives in the areas, among others, of environmental protection, social cohesion (including quality of life), and in the implementation of the EU international obligations. Apart from sustainable production and consumption the main challenges in terms of sustainable development faced by the EU Member States include: climate change and issues related to new clean energy, sustainable transport, protection and management of natural resources, public health, social inclusion, as well as demographic changes and migration.

Assumptions for the Strategy... were adopted by Coordination Committee for Development Policy on 24 June 2010 and by the management of the Ministry of Economy on 22 July 2010. The document was also consulted with the social and economic partners. In June and July 2010 the consultations on Assumptions were held with business environment institutions and research institutes. An additional working meeting on social economy was held with the representatives of Ministry of Labour and Social Policy and Public Benefit Works Council. In the 1st quarter of 2011 the interdepartmental and social consultations of the Strategy took place (ended on 30 March 2011).

There were also additional consultations with the representatives of public administrations, experts, social partners (conference held on 28 March 2011, expert meetings on innovation and competitiveness of Polish Economy in Ministry of Regional Development held on 2 February 2011, meeting of Working Group of small and medium-sized enterprises at the Coordination Committee National Strategic Reference Framework 2007–2013 – held on 28 March 2011, meeting

of the Committee for National Strategic Documents at the Convent of Marshals of the Republic of Poland in Pomlewo on 28 April 2011 and in Gdańsk on 9 June 2011). The Convent of Marshals also discussed the content-related scope of the Strategy – 18 May 2011. The draft Strategy was agreed at the forum of Joint Commission of the Central and the Local Government (meeting held on 27 July 2011). The current form of the document is a result of the originally defined scope of the Strategy and opinions presented during the consultation process[2].

[2] See Annex for the results of the public consultations.

Executive summary

In the long perspective development and competitiveness of the economy strongly depend on its innovativeness. 'OECD Innovation Strategy' shows that investment in intangible and legal assets, as well as investment in ICT, between 1995 and 2006 accounted for two-thirds or three-quarters of GDP growth in several Organisation for Economic Co-operation and Development (OECD) countries, thereby showing that innovations foster growth in the developed economies. According to the World Bank forecast (June 2010) made for Poland under the Europe 2020 project the reforms inspired by the EU Europe 2020 strategy in the area of an increase of the capacity for absorption of new technologies and for innovation could contribute to an increase of GDP by 0.1–0.2 percentage point per year[3]. Spending 3% of EU GDP on research and development would in turn create 3.7 million jobs and would raise the annual EU GDP by almost EUR 800 billion by 2025[4].

Among the factors of economic growth, apart from the productivity growth channel, increase in capital resources and improvement of the labour factor quality should be considered the main channels of R&D and innovation impact on the economy. Being the major determinants of technological progress they affect the growth of the economy production capacity, mainly through more efficient, thus productive use of the existing resources and, therefore, reduction of pressure on the environment. This is particularly important in the context of more efficient energy management (improvement of energy efficiency) which is of key importance for the quality of natural and human environment in Poland. Emergence of new products and improvement of their quality enhance the efficiency of the allocation of production factors as they respond to changing preferences of the consumers.

Technological changes also lead to the changes in relative prices of the production factors. Falling prices of investment goods the productivity of which is

[3] *Fueling Growth and Competitiveness in Poland through employment, skills and innovation, World Bank Europe 2020 Team, Ministry of Economy, 22 June 2010.*

[4] Europa 2020 *Flagship Initiative, Innovation Union*, EC COM (2010) 546 Final.

stimulated by research and innovation contribute to a reduced expenditure on their purchase and thus an increase in capital resources.

Last but not least, research, development and innovation (RDI) are complementary to the activities intended to improve the quality of human capital. New knowledge acquired by the researchers is used by them also in education and thus disseminated in the academic environment and in the whole society. On the other hand, the success of further research depends on the affluence of the new skilled staff. The new production methods also require the employees to acquire new skills and necessary knowledge.

Innovation of the economy should be understood as a capacity and a motivation of the economic operators to constantly search for and practically apply the results of research and development, new concepts, ideas and inventions. The innovation also implies improvement and development of the existing production, exploitation and service technologies, new solutions in organisation and management, infrastructure improvement and development, in particular information collection, processing and dissemination infrastructure. In the context of public sector there are many definitions of innovation, such as introduction of new services, or generally modified methods of organisation and provision of services for the citizens and enterprises while maintaining their high quality, particularly in order to meet the challenges of globalisation and demography[5]. Therefore, innovation is a broad concept which finds its way into all areas of the economic life and depends on various factors.

However, innovations are most often defined according to the Oslo manual of 2005 by the OECD and Eurostat with guidelines for collecting and interpreting innovation data[6]. Based on the methodology of the manual[7] there are four types of innovation:

– product innovations – introduction of a product or service which is new or significantly improved with respect to its characteristics or intended applications,

[5] Albury D., Fostering Innovation in Public Services, [in:] Public Money and Management, January 2005, p. 51–56 and the UN report: *People Matter, Civic Engagement in Public Governance, World Public Sector Report,* UN, New York 2008.

[6] The first edition was published in 1992, the second in 1997 and the third in 2005 (the third edition was translated into Polish and published by the Ministry of Science and Higher Education in 2008).

[7] OECD, Eurostat [2005], Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition, Paris.

- process innovations, i.e. innovations within a process – implementation of a new or significantly improved production or delivery method,
- marketing innovations – implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing,
- organisational innovations – implementation of a new organisational method in the firm's business practices, workplace organisation or external relations[8].

It was assumed that the minimum requirement for an innovation to exist is that the product, process, marketing method or organisational method must be new (or significantly improved) for the enterprise. This includes products, processes and methods that enterprises are the first to develop and those that have been adopted from other enterprises or organisations. A common feature of an innovation is that it must have been implemented i.e. introduced on the market (in case of products) or actually used in the enterprise's operation (in case of processes, marketing methods and organisational methods)[9].

Enterprise innovativeness enhances the innovativeness of the entire economy and helps increase its competitiveness, and, eventually, gross domestic product (GDP). The inverse relationship should also be noted: the investment level in research and development (R&D) area usually depends on the general level of national wealth reflected, for example, by GDP per capita.

In recent years, a specific type of R&D related to the development and use of information and communication technologies (ICT) plays the significant role. It is highlighted because of the impact of these technologies on the economic growth in recent years, both as a result of the sector development, as well as a consequence of the application of its products in the majority of economy sectors (including, for example, the public sector or low carbon economy).

In the *Strategy* ... the **efficiency** is understood as maximisation of effects using given resources or achievement of the intended objective using as little resources as possible (mainly capital input, resource and material input) or

[8] OECD, Eurostat [2005], Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition, Paris, p. 47–52.

[9] OECD, Eurostat [2005], Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition, Paris, p. 46.

optimally allocated resources (apart from the capital resources, the human resources play a key role in this case). Innovation drive and provision of conditions for the smooth running and developing business activity are key elements contributing to an improvement of the management efficiency.

Thus, innovation and efficiency remain the main axis of Strategy for Innovation and Efficiency of the Economy and its multi-layered nature is reflected in the main objective and specific objectives of the document. There are three main reasons of the establishment of the Strategy...:

a) depletion of the existing sources of Polish economic growth, such as relatively low labour costs. In the longer perspective the enterprises operating in Poland will not be able to compete based on such factors, especially in the face of significant economic potential of the developing countries and innovation leader countries. The only opportunity for steady and dynamic development of the Polish economy consists in the use of other sources of competitive advantage, particularly generation of innovation, maximising efficiency and optimising the use of resources (knowledge, capital, work, raw materials and natural resources) which in turn results to a considerable extent from an increased innovation;
b) appropriate response of the State to the strategic challenges requires a proper definition of development objectives and their effective implementation. This depends not only on the available financial resources but also on the method and quality of management system functioning in the public sector. In 2009, the Polish government presented *Assumptions of Polish development management system* to increase the efficiency of programming and to implement the development policy as well as to raise the functioning quality of public institutions. The same year, based on these assumptions, the government also adopted the *Development strategies arrangement plan,* while reducing the number of strategic documents implementing medium- and long-term national development strategy to nine documents. These documents included the *Strategy for Innovation and Efficiency of the Economy* to be coordinated by the Minister of Economy;
c) reform of the national development management system coincided with the global economic crisis while the work on the Strategy... started at the beginning of the economic recovery which was still unpredictable in terms of scale and sustainability. Although the economic downturn was less severe for Poland than for other OECD countries, it has exposed the areas of

Polish economy that require improvement. Position of the Polish economy in the international ratings shows, on the one hand, its high potential and, on the other hand, the barriers to its full use. This is the starting point for the *Strategy* design.

Poland is the sixth among European Union countries and the 20th in the world in terms of economic potential (GDP measured at purchasing power parity), however, it still ranks low in the EU in terms of population's wealth (GDP per capita). In the most recent European innovation performance level assessment – *Innovation Union Scoreboard* 2011 (IUS 2011) – Poland is still below the average of the EU countries, while the summary indicator on innovation for Poland is characterized by the dynamics slightly higher than average. This proves that despite progress there are certain gaps and barriers in the Polish economy, which hinder the stable and dynamic growth based on innovation. They virtually concern all pillars of innovation, i.e. research and development, knowledge, education and financing. The effects of these barriers are reflected by the size of particular indicators included in the summary indicator on innovation. The only indicator which definitely distinguishes Poland compared to other countries is the level of innovation expenditure other than on research and development (176% of EU-27 average). Apart from this indicator, Poland slightly exceeds the EU average in terms of percentage of population with secondary education (age group 20–24) and higher education degree (age group 30–34) and the general export share of medium-high and high-tech products. However, when it comes to innovation and cooperation of enterprises, research and development expenditure, internationalisation of science and the number of patents, as well as introduction of innovation on the market, the recent outcomes have not exceeded the average for all EU countries.

Achievement of a significant improvement in terms of innovation and efficiency requires reasonable adjustments in all areas of economic and social life (public finances, taxes, social capital, infrastructure, law etc.). However, many of these factors which affect innovation more or less directly are covered by other integrated development strategies (ESS, SCDS, TDS etc.). Nevertheless, even the most comprehensive actions in these areas would not guarantee generation of innovation and enhancement of efficiency of the economy without proper connections and mechanisms. The programming part of the Strategy focuses on the areas directly linked to the creation and implementation of innovation

and improvement of competitiveness[10] and efficiency of the economic operators, in particular on ensuring access to knowledge and capital and providing conditions for cooperation among the operators.

The main objective of the Strategy... consists in a *highly competitive economy (innovative and efficient) based on knowledge*[11] *and cooperation*.

Directions of the Strategy... interventions are subordinated to the implementation of four specific objectives, namely:

1) adjustment of the regulatory and financial environment to the needs of innovation (according to Innovation Union Scoreboard IUS 2011, indicators of public and private expenditure on research and development compared to GDP account for 70 and 16% of average indicators for EU-27, respectively, and the investment indicator of venture capital expressed as a percentage of GDP does not attain 36% of EU indicator),

2) provision of the economy with appropriate knowledge and human resources (according to IUS 2011, the share of scientific publications in the group of 10% of the most often cited publications in the world is almost three times lower than the EU average, and the population number with a PhD degree per 1000 citizens aged 25–34 is slightly above half of this the average; in terms of proportion of people employed in the knowledge-intensive sectors in the number of people employed in the industry and services Poland reaches about 68% of the average for EU-27),

[10] According to the Strategy... authors the competitive economy should be understood as the economy which will maintain or achieve higher dynamics of: 1) economic growth 2) employment growth and 3) will rapidly increase the standard of living of its citizens, compared to other countries (EU, OECD). It should be noted that the economy competitiveness consists of the following: enterprise capacity to compete on the national and foreign market, macroeconomic balance of the economy, efficiency of the State and its support for the economy and enterprises, entrepreneurship of the individuals, innovation and efficient allocation of production factors. In the light of this Strategy objectives, the economy innovation and efficiency will be of particularl importance.

[11] According to the OECD definition it is an economy based on creation, dissemination and application of knowledge and information; this is manifested by the upward trend of investment in high technologies, by development of high-tech sectors, as well as by an increase in the number of highly skilled staff and an increasing productivity. See *The knowledge-based economy*, OCDE/GD(96)102, OECD, Paris 1996, p. 7.

3) sustainable use of resources (according to Eurostat, in 2005, the material productivity in Poland was more than three times lower and the energy consumption to GDP indicator was almost two times higher than the average in the EU-27)[12],

4) increase in the internationalisation of Polish economy (in the IUS 2011 scoreboard the share of product export from knowledge-intensive services sector is generally almost one third lower in Poland than the average in Europe, the indicator of new EU trade marks for EUR 1 billion of GDP is slightly over the half of EU indicator).

Intervention directions include both passive elements of the environment enabling the economic and innovation activity as well as active elements stimulating such activities[13]. In both cases activities under the specific intervention directions focus on the gaps and barriers occurring in the widely understood innovation system remaining beyond the direct area of other development strategies. Both activities and their states "to-be" are based on four horizontal principles: the creation of knowledge, partnership and cooperation, effective allocation of resources/ closed loop management and strategic management/responsible leadership. The partner cooperation is a special case, as it is necessary both in the implementation phase of the Strategy and as an objective.

[12] Respectively: 0.4 to 1.3 and 180.00 to 430.57.

[13] This division does not coincide with the area division in the IUS ranking.

Specific objectives and measures

Objective 1: Adjustment of the regulatory and financial environment to the needs of innovative and efficient economy

1.1. Adjustment of the economic regulation system to the needs of efficient and innovative economy.

1.2. Concentration of public expenditure on pro-development and innovation measures.

1.3. Simplification, cohesion and transparency of the tax system to meet the needs of an efficient and innovative economy.

1.4. Easy access to capital for enterprises at all stages of their development, with particular emphasis on high-risk capital and the SME sector.

Objective 2: Stimulating innovation through increase in knowledge and labour efficiency

2.1. Raise the level and efficiency of science in Poland, strengthen its connections with economy and increase its international competitiveness.

2.2. Build framework for efficient innovation policy.

2.3. Support for cooperation on development and implementation of innovation.

2.4. Development of innovation culture and wider inclusion of society into the process of creative thinking and developing innovation.

2.5. Supporting the staff development for innovation and efficient economy.

2.6. Creation of high-quality ICT infrastructure and development of e-economy.

Objective 3: Increased resource and raw materials efficiency

3.1. Transformation of social and economic system towards a 'greener path', in particular limiting material and energy consumption of the economy.

3.2. Support for development of sustainable building construction sector as the stages of building planning, designing, erecting and managing throughout buildings' whole life cycle.

Objective 4: Increased internationalisation of the Polish economy

4.1. Support for Polish export and Polish investments abroad.
4.2. Support for the influx of innovative and responsible investments, including foreign investments.
4.3. Promoting Polish economy, Polish enterprises and Polish image in the international arena.

The Strategy... is consistent with the new EU social and economic policy set out in the Europe 2020 strategy and related documents, as well as with the strategic documents such as *Small Business Act and Single Market Act*. The Strategy..... is envisaged as an important programme for achieving the established EU objectives by 2020. As the innovation policy is of horizontal nature and the actions planned under the strategy exceed the competence of each individual ministry, they will be implemented in cooperation with other ministries and institutions and with a wide range of partners operating at national, regional and local level. Specific programmes, such as Enterprise Development Programme, provide an executive basis for strategy assumptions. Implementation of the Strategy... objectives will be funded from national public funds (national budget, national dedicated funds, local authority budget funds and other), EU public funds as well as funds from other foreign and private sources, including credits and loans, also those secured or guaranteed by entities eligible to provide indemnities or guarantees. Due to the long period of time, consolidation of public funds and new EU financial perspective, it is difficult to specify the sources and costs of the Strategy ..... implementation. According to the NDS 2020 the public funds allocated in the Strategy to development objectives (in line with COFOG) amount to ca PLN 97.3 billion.

Development trends and social and economic background

Changes in the global environment, referred to as global challenges, have a significant impact on the development of the economy and science. The main challenges include: demographic change, ongoing process of global and regional integration, climate change, and changing approach towards innovation.

The societies of the OECD and EU Member States are growing old and therefore the proportion of people in retirement age is steadily increasing. In order to maintain a high economic growth rate and to counteract the negative effects of demographic change, it will be necessary to increase the labour productivity by means of technological and social innovations. The immigration rate especially from countries outside the OECD, may inevitably increase, which in turn may cause social and political problems.

As the reduction in labour intensity of the contemporary economies is in progress, a new interdisciplinary branch of the economy, the so-called leisure industry, is intensively developing. It is related to the rest and spending leisure time by individuals on their own interests and needs. The recipient of the leisure industry products and services is the so-called leisure generation which represents all age groups. This creates additional opportunities for the development of tourism, sports and cultural and entertainment industries and the related creative industries as well as a range of services, including medical services.

The proceeding globalisation which takes a form of an increased mobility of capital and workforce is one of the major challenges. Economic, technological and scientific links both at the state level as well as at the micro scale between enterprises, universities, public laboratories and regional authorities become stronger. This process is accompanied by a departure from the traditional sources of competitiveness in its international dimension, such as low labour costs and access to cheap natural resources, in favour of intangible assets rooted in people, organisations, communities and regions – such assets create the intellectual capital.

The development of our civilization is accompanied by climate change. An increase in the impact on the environment will take place in all countries, especially in the developing countries with a high potential in resources and industrial output and with huge populations, such as Brazil, Russia, China and India (the so-called BRIC countries). One of the biggest challenges that the Polish economy will face by 2020

is the adjustment to the regulations laid down in the EU's energy and climate package adopted in 2009. The package provides for a gradual cutting of the allocation of greenhouse gases emission allowances for the sectors covered by the European Union Emissions Trading Scheme (EU ETS, for energy industry, heavy industry and air transport among others) for Poland - by 1.74% per year, from approx. 200 million in 2013 to 180 million in 2020[14]. It also specifies quota for energy from renewable energy sources in the final energy balance, for biofuels, and for emissions in the non-ETS sectors. In the light of present trends in industry and energy sectors, and growing number of the EU legislative actions aimed at decarbonisation of the economies of the Member States, the key measures which would allow Poland to implement the above-mentioned objectives by 2020 should be expected to include the following: increase in energy efficiency, development of green carbon technologies and investments in green employment directly connected with an increasing share of the renewable energy sources in the energy accounting. The nuclear energy will appear in the Polish energy accounting no sooner than by the end of 2020. The development in these areas will be possible only through an increase of innovation and efficiency of the Polish economy. In the light of global challenges resulting from the climate change it will be important to search for niches for the Polish economy in the situation of emissions reduction and growing competitiveness in the global market. Such niches would bring not only the tangible social and economic benefits for the country and would also increase the efficiency of development assistance and/or climate assistance provided by Poland for the developing countries.

The above trends are accompanied by a change in the approach towards innovation. The role of social and organizational innovation is growing, compared to technological innovation of hardware type. Significance of intangible factor is growing in the innovation area (know-how, marketing, information, resource management, tacit knowledge). Furthermore, the importance of outsourcing, especially at the stage of research work, and the importance of technology market and of technologically advanced SMEs are growing. Relationships among different market participants (competitors, co-operators, customers) in the area of learning become more intense. The traditional divisions between different sectors (for example agriculture and processing industry), industries (integration of rail, road and sea transport), fields of operation (trade, education, entertainment and tourism) and between different types of scientific research (basic and applied research) and development works are fading away.

[14] Kashue estimates, tab 4: http://www.kashue.pl/materialy/opracowania/kwiecien2010/KASHUE_Wyliczenie_uprawnien_08.04.2010_po_uzg_wewn_FINAL_na%20strone.pdf

Regardless of the above changes, it should also be noted that important changes in the area of scientific research, technological development and innovation activity have taken place. The role of the so-called general purpose technologies, such as ICT, nanotechnology and biotechnology, is rising. These technologies contribute to an increase in overall productivity and competitiveness of many other sectors, including the traditional industry and service sectors.

ICT keeps stimulating technological and economic growth (it increases productivity in other sectors and compared to other sectors it has the highest percentage of spin-offs). Despite numerous radical turning points in the history of ICT technology, its potentially high contribution to the economic growth will continue in the coming years.

New, multidisciplinary fields of research are emerging. They change the old classification of sciences - they transform different disciplines and combine them into new configurations, for example they integrate ICT, bio- and nanotechnology. Slowly a fusion of bio- and nanotechnologies (or bio- and nanotechnology or cognitive sciences[15]) is emerging as the next (forecasted) model of technological and economic development. Computerisation is having an increasing impact on scientific research (storage, search and transmission of information, development of new research techniques which cannot be applied or are extremely time- and cost-consuming without the use of computer or computer network). The role of simulation as a fourth element of scientific research, in addition to the theory, experiment and application, is also growing.

Furthermore, the approach towards higher education and the role of the universities themselves are also changing: demand for new skills and professions which requires greater diversification of the university curriculum and better adjustment to the market needs is emerging. The mobility of academic staff and students is increasing similarly to the competition between universities. Universities become more open to the environment in which they are functioning and also become centres for the creation of social capital and creativity.

These changes also affect the evolution of scientific policy and higher education as well as the instruments of these politics. The competitive funding of projects compared to the funding of entities (statutory funding) and incentives for universities

[15] That is interdisciplinary research using psychology, linguistics, artificial intelligence and philosophy.

and public research organisations to orient scientific research to the areas of interest of private enterprises become increasingly important. The importance of organisational structures which support scientific cooperation (as well as that of enterprises), such as research networks, scientific and industrial consortia and regional and industry clusters, is increasing. The growing importance and popularity of the cluster concept and the influence of clustering on the economic growth led to creation of cluster supporting policy, for example the recently developed by OECD cluster-based economic development policy. It is worth to take note the European Commission's definition of clusters, which may be significantly important because of the growing interest in this form of cooperation. According to the definition a 'cluster is a method of production system organisation resulting from the geographical concentration of economic operators and other organisations specialised in the same areas of operation and developing market and non-market relationships that together contribute to the development of innovation and competitiveness of cluster participants and their area of operation'[16]. Thus, the European Commission additionally emphasises innovative solutions which should result of cooperation within the clusters. The EC also underlines the positive impact of cooperation not only on the cluster participants but also on its business environment[17].

The mobility among scientific institutions and all entities of the innovation system (for example universities, public laboratories and enterprises) is also growing. Similarly, the policy supporting venture capital, seed capital and starting capital becomes increasingly important. The role of the policy horizontal aspect for science and technology development is playing more significant role (unlike the industrial or selective). Scientific and innovation policies increasingly become policies based on facts and objective data (evidence-based policy), to greater extend they use synergies between various policies as well as territorial dimension (place-based policy).

Public expenditure on research and development (R&D) activities are more and more often considered a long-term investment aimed to improve the competitiveness of the economies. Despite the global economic crisis the public expenditure on R&D in most of the OECD countries have increased or remained at the level similar to previous years. This proves that investing in R&D activity is a priority for many countries and, in a relatively low extent, is subject to business cycle.

[16] Mikołajczyk B., Kurczewska A., Fila J., Klastry na świecie. Studia przypadków, Difin, Warsaw 2009, p.15–16.

[17] Ratajczak-Mrozek M. (ed.), Kooperacja polskich przedsiębiorstw, Study for the Analyses and Forecasting Department of the Ministry of Economy, Poznań, December 2010.

Apart from the global situation, the most important factors which determine the path of economic growth in Poland in the horizon of the Strategy (especially its first phase) include the development of economic situation of the biggest business partners, i.e. a group of the European Union countries, the scale and structure of fiscal consolidation and tendencies outlined above, especially demographic trends, and the related significant decrease in the number of people in productive age. All of them will be crucial for the growth of GDP, its structure, inflationary processes and the development of the situation in the labour market. It should be noted that although the experience of the recent financial crisis highlighted the relative resilience of the Polish economy to the effects of external shocks, it was not completely resistant to the global economy impact. In 2010, with the recovery in global trade and improving economic conditions of the major business partners, GDP growth in constant prices in Poland has accelerated to 3.9% yearly compared to previous year and to 4.3% year-to-year in 2011[18]. The domestic demand including private consumption and increase in inventories were the main sources of growth in 2010. The relatively high rate of consumption growth was due to employment and income growth. In 2011 gross fixed capital formation experienced the fastest growth (9.0% yoy). In the first half of 2012 this tendency has been maintained. Gross fixed capital formation again showed the highest growth rate among all GDP components, although in the second quarter (1.3% year-to-year) their growth rate has significantly slowed down[19].

It should be noted in particular that a significant uncertainty associated with the global macro-economic situation in relation to the development scenario for the first years of the Strategy.... implementation exists. The results of the economic policy were the main sources of uncertainty. The scale of measures applied during the crisis and challenges associated with public finances in many countries enhance the uncertainty about the response of economic operators, including households and enterprises, to these measures. This uncertainty can cause delays in response to the economic recovery or undermine belief in the sustainability of the current recovery. Particular attention should be paid to the external risks for the Polish economy.

Data and forecasts on the global economy situation show that the period 2012–2013 can be characterized as a period of lower global GDP growth, especially compared

[18] The revised quarterly estimates of gross domestic product for the period 2008–2011 and for the first and second quarter of 2012, Central Statistical Office, Warsaw 22.10.2012.

[19] Ibidem.

to good results in 2010–2011. This is particularly reflected in the slowdown of Polish exports growth and may furthermore affect polish enterprises. After a dynamic growth in 2011 (9.0% yoy) private investments are expected to increase in the coming years, however, the scale of their growth will be lower. This will be mainly a result of the assumed stabilisation of global economic situation and depletion of the existing production capacity. The dynamics of public investments will be determined, on the one hand, by limitations resulting from the ongoing consolidation measures and, on the other hand, by the use of funds to finance the infrastructure expenditure from the EU. It is estimated that the highest growth in investments from EU funds took place in 2011 and contributed to a record and the highest in the whole EU 5.7% share of public sector investment in GDP. In subsequent years the share of public investments in GDP will be decreasing. As a result, we expect the average growth rate of GDP close to 2.4% in the perspective to 2015.

The current inflation trends in fuel and food prices determine the national price indexes. In 2011, consumer price index reached 4.3% and was higher than the expected 3.5% by 0.8 percentage points. In the next years covered by the forecast will show a gradual adjustment of the rate to the level of 2.7% in 2013 and further slow reduction. In the case of consumer price index the upper limit of inflationary objective of the European Central Bank (2%) will be the long-term objective.

The improvement of economic conditions, including the growing investment demand, will have a positive impact on the growth in labour demand. However, the unfavourable demographic trends will significantly limit the supply.

Changes that occur in economy structure and the influence of labour demand and supply should also be taken into consideration when planning economic policy. It should be noted that the overall employment growth will be accompanied by changes in the staff competence and market expectations. It is expected that the number of employees with higher and medium qualifications will increase at the EU economy level while the latter will prevail in the labour market. The primary sector (including raw materials subsectors – agriculture, mining and energy) and the manufacturing sector will be characterised by a decreasing labour demand while the employment will grow in the services sector, especially market services. New jobs will be created in the transport, health and education sectors (absorbing a certain proportion of jobs shed in the administration). The existing observations prove that the employment level in the knowledge-intensive and skill-intensive sectors is expected to continue increasing in size. There

will still be a high demand for employees with low qualifications needed by the trade enterprises. These trends are visible in Poland - between 2010 and 2020 the number of employees with low (a drop by 50% is predicted) and medium qualifications will fall down and an increase will only be noted among highly qualified employees. Poland belongs to a group of countries where the share of medium and high skilled groups (in total) is relatively high, but changes that will occur in the next 10 years will not be significant. Taking into consideration only the group of high skilled people Poland belongs to the group described as 'low share – big change'. In terms of labour demand – between 2010 and 2020 a reduced demand for labour in the primary[20] (one of the highest in the EU, by approximately 36%) and manufacturing sectors while the employment in construction and services sectors (transport, business services and non-market services) are expected in Poland. Paradoxically, the surveys also show that we can expect an increase in demand for the unskilled and skilled blue-collar labour and a reduced demand for skilled (even highly skilled) white-collar workers, whereas the quality of qualifications at each level must be improved[21].

Changes in final demand will remain a fundamental determinant of import growth in Poland. The structure of final demand with relatively high share of import-dependent export and investments as well as reserves cause changes to be strongly pro-cyclical. Significant slowdown of the global economy and investment and the relevant large uncertainty about the economic outlook should cause a positive contribution of net exports in the near future. In the following years the contribution of net export to the economic growth should be already neutral with the particular demand components in GDP gradually stabilizing.

The growth rate of the domestic demand also significantly affects the shape of the current account balance deficit. The scale of external imbalance increment should, however, remain moderate, because the growing trade turnover deficit should be partially offset by an increasing surplus of current transfers mainly due to the inflow of funds from EU budget. However, based on the forecast, the expected deficit will not be lower than 3% of GDP.

[20] It includes: agriculture, mining and extraction as well production and distribution of electricity, gas, and water.

[21] *Skills supply and demand in Europe, Medium-term forecast up to 2020, The European Centre for the Development of Vocational Training (Cedefop), Luxembourg: Publications Office of the European Union, 2010.*

Macroeconomic conditions are extremely important from the point of view economic operators (enterprises, research institutes), their current activity and development perspectives.

At the same time, the experience and current development trends as well as assumptions of rational conduct of all economic operators do not allow to define economic changes in detail, even in the medium perspective. The current progressive changes are not continuous, and the technological progress compel the development of industries that just few years ago have been marginal or unknown. While planning solutions in 10 years perspective it is necessary to identify certain development assumptions and priority directions, but this does not imply that the policy in this area will not be reformulated at the Strategy... horizon. This may be caused by the crucial changes on a world scale (global inventions).

Technological changes, in turn, significantly affect the structure of necessary competence and the change may be relatively sudden (irregular) producing an additional challenge. Due to a greater emphasis on the green economy projects the *Foresight of personnel in modern economy*[22] shows an increased demand for experts in the field of new energy technologies, logistics and energy-oriented agriculture as well as environment protection and waste disposal. In many sectors, even those with high employment levels and clear predictions of further rapid production growth (for example, ICT industry), it is difficult to forecast changes in demand for specific labour, because the sector is highly dynamic and the changes that take place result in the emergence of new professions and finding newer and newer technology applications. Uncertainty of the labour market expectations combined with the time required to adjust the school curriculum to the needs of the market is an important problem in of educational policy planning and confirms the need to bring individual industries and educational sector closer as well as to implement the life long learning model. It should also be noted that in the case of some industries and professions learning a particular technology should be conducted carried out on the basis of on-the-job-training[23].

[22] Matusiak K. B., Kuciński J., Gryzik A. (ed.), Foresight of personnel in modern economy, PAED, Warsaw 2009, p. 14, 49, 132–133.

[23] Sztandar-Sztanderska U. (ed.), Kwalifikacje dla potrzeb pracodawców. Final report, part of the Qualifications Adjusted to Employers' Needs Project implemented by PKPP Lewiatan, Warsaw, June 2010.

Should the perspectives of Polish innovation be identified against the advancement level of high and medium technology and knowledge-intensive services industries, then (1) for industrial processing (the most important industry subsector) the current structure of production sold, broken down into technology levels, underlays production development of the following articles in the future: pharmaceutical goods, radio, television and telecommunications appliances and equipment, medical, precise and optical instruments, watches and clocks, machinery and equipment. Between 2005 and 2008 all these industries were characterized by the growing share in the structure of the marketed production. Bio- and nanotechnologies as well as information technology will be the driving force behind the development. *Foresight of personnel in modern economy* extends it to medical, financial, educational and security technologies[24]. In terms of services the current structure of foreign investments points to the future development of outsourcing services focused in three areas: Business Process Outsourcing (BPO), Shared Service Centre (SSC) and Knowledge Process Outsourcing (KPO).

An impulse for digitization should have been generated by the private investments in ICT and media sector in line with the principle of higher economic productivity in the environment of open exchange of knowledge, open innovation (where knowledge is considered to be a public good) and selected sectors of information- and knowledge-intensive services selling and buying market where the processes of open access to that knowledge and information should receive support. Changes in the energy sector where productivity improvement is necessary may also be of importance, so that high level of ICT use may be ensured. Using the ability to quickly find business solutions for inventions as well as for innovative social and cultural models and in the future broadband technologies, *Future internet* technologies, Internet of things, semantics, multimedia, as areas of innovation, may become an opportunity.

[24] *Foresight of personnel* identifies the following areas as the most promising from the perspective of labour market: automation, robotics, construction and civil engineering; care service, quality of life; business-related services; tourism, recreation, leisure; nutrition engineering, food industry; logistics and transport engineering: environmental engineering (equipment for environmental protection). *Foresight of personnel in modern economy* project was implemented in the first quarter of 2009 at the request of Polish Agency for Enterprise Development by the consortium of Institute of Fundamental Technological Research (coordinator), Polish Chamber of Commerce for High Technology and SMG/KRC Poland Media S.A.

Diagnosis

Is the regulatory and financial environment adjusted to the needs of innovative and efficient economy?

In the opinion of many economic operators the institutional environment does not facilitate doing business. This is mainly due to the law provisions which impose excessive administrative burdens in the opinion of the economic operators. The problem is also associated with the law-making system in which the mechanisms that prevent 'inflation' of law are insufficient. It happens that the provisions are amended so that new administrative burdens are imposed on economic operators. The costs and risks of activity do not diminish in consequence. Therefore, many economic entities do not launch investments and innovation to the extent which ensures development, and what is more, the majority of enterprises still do not run their businesses based on long-term development plans. This translates into the smaller competitiveness of the economy. The smaller the enterprise, the more noticeable barriers and this rule is observed throughout the whole European Union.

Although the Polish economy has not experienced recession between in 2009 and 2010, the slowdown in GDP growth in this period had an adverse impact on the level of tax revenue. The dynamics of proceeds from income tax provides the best picture of the economic slowdown, especially in the case of corporate income tax which is very sensitive to sudden changes in economic conditions[25]. The structural changes also contributed to the deterioration of public finances, as they reduced the income from public finance sector (adoption of a reduction of taxes and premiums without the corresponding reduction of expenditure in the period 2006–2007), but they cushioned the negative impact of the crisis to some extent. The general government deficit increased from 3.7% of GDP in 2008 to 7.9% of GDP in 2010, whereas in 2011 it amounted to 5.0% of GDP. A high public finance sector debt adversely affects the economy. Besides, it is worth noting that certainty of annual plans still exists in most areas of econom-

[25] Convergence Programme – Update 2011.

ic policy despite the multi-annual budgetary planning mechanism (introduced by the Act of 27 August 2009 on public finance and effective as of 2010). This introduces a great deal of uncertainty to the economy, hindering the long-term planning also for the enterprise sector.

In the context of the regulatory and financial environment analysis it is worth to ask whether the current tax system responds to all needs of efficient and innovative economy. Despite a number of changes introduced by amendment to the Act of 2008 on value added tax[26] and the subsequent facilitations (for example introduction of e-invoices), favourable for the enterprises, the all VAT regulations still generate a large burden for the enterprises in the opinion of the economic operators. The economic operators also report inconsistency of the provisions on income taxes or numerous public-legal levies. The basic measurement made in 2010 shows that the accounting record to demonstrate the income (loss), the tax base and the amount of tax due in a given tax year (PLN 9.5 billion per year) as well as to file a tax return (PLN 6.8 billion) is the notification duty which generates the highest regulatory costs[27] in the economy[28].

Limited access to capital is one of the major barriers to development of the Polish enterprises, especially SMEs, and to the improvement of the economy innovation. Surveys of the Ministry of Economy show that in the opinion of Polish enterprises the major barrier for SMEs to introduce innovation solutions, is the lack of financial possibilities or excessive costs[29]. Although the problem applies to most enterprises that introduce innovations regardless of the size of the operator, these are SMEs which may finance innovation activities from own funds to a significantly less extent than the large enterprises. In addition, they generally face more difficulties to obtain external financing. As for financial liquidity of

[26] Act of 7 November 2008 amending the Act on goods and services tax (Dz.U. [Journal of Laws] No 209, item 1320).

[27] Costs incurred by the recipients of regulations as a result of the necessity to implement these regulations.

[28] Basic measurement conducted by the Ministry of Economy concerned administrative burdens imposed on entrepreneurs by economic law regulations. 6.2 thousand notification obligations, found in 482 legal acts, were analysed in total. The survey shows that the total annual administration costs incurred by the enterprises in Poland amounted to PLN 77.6 billion, i.e. to about 6.1% of GDP. The total amount of annual administrative costs amounts to PLN 37.3 billion (about 2.9% of GDP).

[29] Trendy rozwojowe sektora MŚP w ocenie przedsiębiorców w drugiej połowie 2012 r., ME, No 2/2012.

the Polish enterprises, delayed payments, especially during the economic slowdown, has significantly affected the business and not receded in recent years.

The share of enterprise sector in the bank credit volume in Poland amounts to 30% only (about 37% including individual enterprises) with approximately two thirds spent on the purchase of the property and current needs[30]. Nevertheless, the Polish banking sector is still financing most investments in innovations. Recently, the number of loan funds and their capital increment rate has decreased in Poland. Loan funds are important for the innovation economy, as most of the loans from these funds are used for investment. Since 2007, participation of local governments in financing their loan capital is growing (apart from funds from regional operational programmes)[31] - on the one hand it is a positive symptom of local authorities activity, but on the other hand this might be a manifestation of the lack of sufficient interest of private investors in this market. The positive effects of state support occur on the guarantee funds market, where despite the much smaller number of active operators and capital value, the scale of their captivity is almost three times higher. Among 39[32] enterprises engaged in factoring services there are 19 commercial banks and only 20 specialist enterprises. Thus, in spite of dynamic development the factoring activity is rather a secondary activity still.

PE/VC funds get involved most frequently in the most innovative investment projects. In Poland, such investments are negligible. Although in 2010 the investments increased a two and half times up to EUR 657 million (compared to EUR 267 million in 2009, EVCA data) and accounted for half of PE/VC funds invested in Central and Eastern Europe, it was still 0.192% GDP. One year later it was EUR 689 million, i.e. 0.18% GDP. In terms of value the majority of such investments were assigned to the consumer goods and services sector and communication sector. There is still little involvement in the high-tech industries.

The major problem of the Polish enterprise financing system is that also the enterprises show little interest in and poor knowledge of the possibilities offered or that could be offered by a widely understood financial market. The survey by

[30] Based on Assets and liabilities of monetary financial institutions, National Bank of Poland, as of July 2012.

[31] Polish Association of Loan Funds, Fundusze Pożyczkowe w Polsce wspierające mikro, małe i średnie przedsiębiorstwa według stanu na 30 czerwca 2009 roku, Report No 12/2009.

[32] Participants of the survey on factoring sector conducted by Central Statistical Office in 2011.

the Polish Agency for Enterprise Development[33] shows that two thirds of small and medium-sized enterprises have never applied for a credit or loan, as they did not need them or were afraid of incurring debt. Such attitude of the entrepreneurs strongly affects the efficiency of various types of supporting instruments based on the principle of returnable financing. It requires time, intensive awareness campaign and training of enterprises in the field of strategic management to change this attitude.

Under the operational programmes financed from the European sources not only the projects providing better access to capital are implemented, but also projects which contribute to the development of other areas covered by the Strategy... (for example telecommunications infrastructure, research and development activity, development of staff competence). While European funds are unanimously considered a significant support for the Polish economy and an opportunity to reduce the civilisation gap between Poland and EU-15 countries, adjustments are requested to ensure really efficient support in terms of the their distribution system. At the operational level various options are considered, such as: improvement of the procedures of fund awarding to the beneficiaries (including the application forms, requirements and formal evaluations regime, methods of control and recognition of costs)[34].

Financing investments through the public-private partnership (PPP) or through the long-term infrastructure bonds is also neglected. According to the survey results the slight proportion of undertakings conducted under public-private partnership formula for implementation of public tasks in Poland is the effect of poor awareness among potential interested operators, mistrust towards PPP relationships, and low number of good examples of the implemented PPP projects in the first place.

Insufficient innovativeness of the Polish economy.

Science and higher education in Poland have undergone a deep transformation over the last 20 years. There were system changes in learning and higher education consisting in adjustment to the con-

[33] Market survey of selected services to support the development of entrepreneurship and innovation in Poland – the area of "returnable financing" 2010.

[34] Cf. for example the EU aid funds - experience and perspectives, Ministry of Regional Development 2007.

ditions of the market economy and Polish integration with the European Union. Also significant demographic changes (the number of students increased almost in five times). Dynamically changing conditions and the need to meet development dilemmas also raise new challenges to the Polish science and higher education[35]. To start with the assessment of the current situation of Polish science and its links with the economy, the expenditure ratio on R&D needs to be analysed. The total expenditure on R&D activity (*gross domestic expenditure on research and development,* GERD) in Poland amounted to PLN 9.07 billion (current price) in 2009; this is an increase by 17.7% compared to the previous year. In 2010 the expenditure amounted to PLN 10.4 billion, which translates into an increase of 14.8% yoy[36]. Despite a substantial increase in R&D investments in recent years, the share of GERD in GDP is still relatively low in Poland: in 2009 it was 0.68%, whereas in 2010 – 0.74%. This share was higher than in Slovakia, Greece and Romania, but lower than in the majority of OECD and EU countries (EU-27 average in 2009: 2.01% of GDP, in 2010: 2.0%; OECD average in 2009: 2.4% of GDP) and in some of the countries of the so-called BRIC group (Russia: 1.25% of GDP, China 1.7% of GDP). The low share in the internal R&D investments of the enterprise also illustrates the problem of the scale of necessary adjustments to be made by the Polish enterprises: 24.4% in 2010 (the share of budget amounted to 60.9%; higher education – 2.5%, private non-profit institutions – 0.3%, and foreign countries – 11.8%)[37]. However, the amount of expenditure on R&D measured by the amount of expenditure incurred by the enterprise sector on GDP amounted to 0.2% in 2010[38].

The structure of the current R&D investments in Poland is characterized by a slowly progressing 'polarization of R&D spectrum': the area of applied research is gradually shrinking at the expense of basic research (funded almost entirely by the national budget) and development work (funded mainly by the market). Over the period 1996–2010 the share of applied research in expenditures on R&D activity has decreased, by 4.1 percentage points in the current prices[39].

In recent years organisational changes in terms of units involved in R&D have specifically been occurring. While the number of involved enterprises is increas-

[35] *Report Poland 2030. Development challenges*, Warsaw 2008, p. 233.

[36] Central Statistical Office, Local Data Bank.

[37] Central Statistical Office, Nauka i technika w Polsce w 2010 roku, Warsaw 2012, p. 56.

[38] Central Statistical Office, Local Data Bank.

[39] Central Statistical Office, Nauka i technika w Polsce w 2010 roku, Warsaw 2012, p. 187.

ing, the number of units operating under the Act of 30 April 2010 on research institutes is decreasing - this is the result of transformation processes (consolidation, commercialization and liquidation) carried out by the relevant ministries and (to a lesser extent) of the change in research R&D units status. The scope of activites carried out by the enterprises in the R&D area is still relatively narrow in terms of the R&D investments and staffing. The involvement of non-public schools in R&D activity is also low.

Considerable increase in the number of inventions registered in the Polish Patent Office (increase of 91% in the period 2005–2011) is a positive sign. In 2011, 3878 patent applications were submitted while the number of patents issued amounted to 1989. Also 940 utility models applications were submitted (57% more compared to 2005) and 498 intellectual property rights were granted[40]. At the same time the number of Polish patent applications submitted to the European Patent Office (EPO) per 1 million residents amounted to approx. 8 in 2010 (for Germany, Sweden, Finland and Denmark it was more than 200)[41].

The proportion of Polish researchers who publish works jointly with the EU partners (25.2%, 2003) exceeds the EU-25 average (22.9%). The United States (25.2% publications jointly with the foreign co-author), Germany (23.1%), France (14.8%), Great Britain (12.5%) and Italy (9.3%) are the main partners of the Polish researchers.

In international comparative terms, the Polish economy innovation has not been rated highly. This is confirmed by various surveys and reports, of which one of the most important is the report titled Innovation Union Scoreboard[42]. According to the most recent version of the report (February 2012), although Poland remained in the group of moderate innovators to which it was promoted a year ago from the group of catching up countries, it is now classified as the last in this group: behind Italy, Portugal, Czech Republic, Spain, Hungary, Greece, Malta and Slovakia. According to the survey results, Poland's Summary Innovation Index (SII) is lower than the average for all countries of the

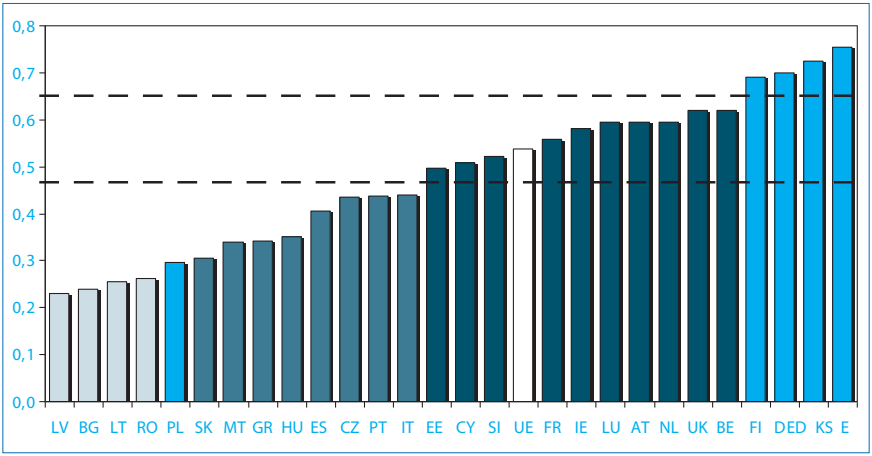
[40] Central Statistical Office, Concise Statistical Yearbook, Warsaw 2012, p. 303.

[41] Eurostat.

[42] previously European Innovation Scoreboard. IUS is based on 25 indicators which reflect the situation of national research and innovation systems better than the previous publication (based on 29 indicators). IUS is also a tool for monitoring implementation of the flagship project of Europe 2020 strategy - Innovation Union.

European Union, but slightly higher than the EU average growth rate of this index. In 2010 human resources and so-called performance indicators were recognised as relative strengths of Poland, while in 2011, apart from human resources, its strengths included financing and support, corporate investments and economic effects. Over the period of last two years weaknesses invariably persist in the whole research system, cooperation in the field of innovation and entrepreneurship, and indicators related to the protection of intellectual property. Strong increase is observed in the number of patent applications, Community designs and patent licenses and in the revenue from the export of advanced products and services (only in two latter areas in 2011). The negative rating concerns the number of innovative SMEs and their cooperation with other entrepreneurs.

Chart 1 The values of Summary Innovation Index (SII) for the EU-27 countries.



Source: Pro Inno Europe, Inno-Metrics, Innovation Union Scoreboard 2011, The innovation union's performance scoreboard for research and innovation, 1 February 2012.

Poland is on one of the last positions in the EU-27 ranking in terms of enterprises share engaged in innovation activities. According to the latest available Eurostat data for the period 2006–2008[43], this indicator (for industrial enterprises employing more than 9 persons) decreased for Poland compared to the previ-

[43] Due to the low quality of data (such as the incompleteness and uncertainty as to the veracity of data) it is impossible to use Eurostat data for the period 2008–2010 in order to compare the results of Poland and other EU Member States.

ous period and amounted to 22%, which was the third lowest score in the European Union, just before Romania and Hungary. The biggest difference to the detriment of Polish enterprises in the percentage of innovation enterprises lies in small enterprises.

The entrepreneurs are still quite cautious when it comes to expenditure on innovation. As they are uncertain about the successful implementations they do not consider the innovations to be a contribution to the future competitive advantage. In Poland, the enterprises use primarily their own resources to finance innovation. Despite some minor changes, the situation has not improved radically in this respect. The use of external sources, such as lending, venture capital funds, and EU funds, is still too small. On the other hand, the existing tendency among the enterprises to implement non-technological innovations, i.e. organisational and marketing innovations, is optimistic as far as innovation is concerned.

The available public statistics indicate poor cooperation of enterprises and research institutes caused, among others, by unavailability of information about the individual units offers. However, the problem background is much broader. It lies primarily with the poor social confidence and lack of traditions and cooperation models in the Polish society. The limited scope of cooperation among the enterprises is extremely distinct in the process of creating innovations. While there is a growing awareness among enterprises about the role of innovation as an important factor ensuring the competitive position, the enterprises still approach innovation as a casual business rather than as a continuous process permanently integrated with the business. This in turn results in a limited possibility of cooperation among the operators in the area of innovation. Enterprises rarely use the new forms of innovation such as open innovation, user driven innovation, and finally social innovation.

The economy innovativeness is strongly influenced by the institutional environment which provides support for innovation activity of enterprises which include various types of institutions, such as training and consultancy centres, technology transfer centres, technology/business incubators, loan funds, technology parks, etc. Despite an increase in the number of innovation and entrepreneurship centres - Polish Business and Innovation Centres Association estimates its number at 735 (263 in 2000) – the support for enterprises in the area of innovation is still insufficient. These centres should also include more specialised services in their offers.

Cooperation of schools and universities with the labour market also needs to be improved. This includes areas such as education (few employers involved in development of school curricula, poor involvement of the practitioner staff in the teaching processes), joint research projects (research on their own very often easier and faster than having it done by the university research facility), funding (for example sponsoring, rather symbolic) and flow of information (e.g. on the demand for skills and the qualification of graduates employed)[44].

In Poland, the potential for innovation and R&D activity concentrates around the major academic centres: Warsaw, Wroclaw, Krakow and Trójmiasto. This conclusion is based on the joint survey of the Ministry of Regional Development and Institute for Structural Research[45] that was published in 2009. Mazowieckie Voivodeship[46] has the greatest innovation potential (Warsaw agglomeration, in particular), but mainly in terms of the scale of research rather than its share and commercial effects which are at the level slightly above the average domestic values. The science sector of Małopolskie and Pomorskie Voivodeships is also considered strong. The voivodeships such as Dolnośląskie, Śląskie, Pomorskie and Małopolskie also show a large innovation potential. In the case of Wielkopolska Voivodeship the impact of recognised academic centre is impaired by a low rate of enterprise innovation and mediocre expenditure on R&D. Podkarpackie Voivodeship is an above-average region in terms of innovation of private sector (compared to the number of residents). Generally, eastern and north-western voivodeships are characterized by lower innovation of enterprises and relatively weak academic centres.

Taking into consideration the institutional aspect of regional innovation systems, in most Polish voivodeships the activities oriented towards strengthening the innovation and technology transfer are scattered and isolated from the environment and do not have strong networking relationships. This problem is also found in the area of skills, research and innovation support infrastructure and

[44] Sztandar-Sztanderska U. (ed.), Kwalifikacje dla potrzeb pracodawców. Final report, part of the Qualifications Adjusted to Employers' Needs Project implemented by PKPP Lewiatan, Warsaw, June 2010.

[45] Identyfikacja i delimitacja obszarów problemowych i strategicznej interwencji w Polsce, Ministry of Regional Development, Institute for Structural Research, Warsaw 2009.

[46] Ministry of Economy, Analyses and Forecasting Department, Analiza zróżnicowania regionalnego aktywności inwestycyjnej sektora MŚP, ze szczególnym uwzględnieniem działalności innowacyjnej, July 2010.

technology transfer. These shortcomings combined with relatively low awareness of the importance of innovation affect the quality of institutional innovation system in voivodeships. Dispersion of activities among various organisational units or large formalisation of relationships with the environment do not facilitate the creation of efficient regional innovation systems.

Knowledge efficiency and stimulating innovation processes also involve staff adjustment to the requirements of modern economy. Currently, some graduates do not have skills and qualifications sought after and valued on the labour market. Apart from the technical skills, soft skills such as reliability, honesty, motivation, commitment, ability to work in a team are also valued. In the light of innovation development in Poland, particular attention should be paid to strong links in the process of relationships between employers and universities. These links are currently poor. Graduation from a university should imply that the graduate has acquired all appropriate skills which are desired by the employers and raise their competitiveness in the labour market. During the studies the graduates should also acquire the key skills that are essential for personal fulfilment and development and to become an active citizen or for raising the level of their employability. According to the Lisbon Council Brussels Institute "the most important skill is the ability to formulate comprehensive solutions for new, unpredicted problems and acquire new different skills throughout the life". Therefore, the culture and creative sectors play an important role in acquiring soft skills, as they create potential for the development of social capital and, as a result, the development of creativity and innovation.

The innovation is strongly interrelated with the infrastructure of information and communication technologies (ICT). Despite significant improvements in recent years, it is still unsatisfactory and below the EU standard. It is characterized mainly by poor accessibility and quality of services. According to the European Commission at the end of 2011 the total penetration rate (fixed and mobile technologies) per the number of households amounted to approx. 73% for EU-27. With the rate of 67% Poland takes position in the middle of European countries with access to the Internet (data – Eurostat 2011). The level of development of new generation network based on fibre optic infrastructure also differs. According to the OECD data the number of FTTX (FTTH and FTTB) links in Poland amounted to 0.4 per 100 residents by the end of 2011. Broadband Internet infrastructure in Poland is still poorly developed and the network activity is low. The situation can be improved with the help of EU funds available under the operational pro-

grammes for the period 2007–2013 which are intended to build broadband Internet infrastructure.

Polish enterprises also show little interest in modern management system. The enterprises relying on the automatic exchange of information inside the enterprise in January 2011 accounted for 34.5% of all enterprises. The enterprises, as well as individual users, do not take advantage of full potential of ICT, and they fall far behind other European countries in key development aspects. According to the Central Statistical Office 16.4% of enterprises and 39.1% of people aged 16–75 made orders via computer networks (between April 2009 and April 2010)[47].

The advantage of Poland in this area consists in the ability to provide high quality services of programming software integrated with hardware (embedded software, intelligent hardware) in the projects of intelligent energy, intelligent transport and intelligent drivers, in accordance with the process of IT technologies spreading in the appliances and with growing market of services associated with the short-run tailored production that requires expertise. Poland has also considerable experience in manufacturing intelligent household appliances (TVs, monitors, domestic appliances, lighting) which will become an essential element in building smart cities as a result of the ongoing process of adding appliances to the network (Internet of Things). Thus, we have an opportunity to take advantage of the existing centres for developing software integrated with hardware (including cooperation with existing centres of global ICT corporations).

Insufficient efficiency of using natural resources and raw materials.

Material intensity and energy intensity of the Polish economy is higher than average in the European Union. If the situation is staved off the production costs will not only be reduced in the future, but also the pressure on the environment will be released and fairer distribution of environmental resources between generations will be ensured. The need to improve the efficiency of natural resources and raw materials will also significantly stimulate innovation in the economy.

[47] Source: Wykorzystanie technologii informacyjno-(tele)komunikacyjnych w przedsiębiorstwach i gospodarstwach domowych w 2011 r., Central Statistical Office, tab. 13 and 20.

One of the material intensity measures of the economy is material productivity which is calculated as a ratio of GDP and national consumption of materials. The higher the value of this ratio, the less materials are used for producing a GDP unit. According to the Eurostat data, material productivity for Poland has increased from 0.33 to 0.42 between 2000 and 2009. On the other hand, the EU-27 average has increased from 1.22 to 1.41 in this period. This highlights the need for intensifying actions aimed at reducing the use of materials and raw materials for production.

In Poland energy intensity level is one of the higher in Europe. In terms of the energy consumption ratio to GDP (in kg of oil equivalent per EUR 1000 of GDP), in 2010, Poland ranks 8th in Europe (373.86). The average value of so defined energy intensity ratio in EU-27 is more than two times lower (167.99), so there is a great potential Poland to reduce the energy consumption. It should be noted here that Poland has managed to reduce energy intensity by almost 23% compared to 2000 level, while the reduction in the EU-27 was around 10.3% on the average.

Concepts of environmental management become increasingly important in the policy of individual enterprises. They consist mainly in acknowledging the natural environment as an integral part of all areas of the enterprises activities and are intended to reduce to a minimum the adverse impact on the environment. In Poland, relatively few enterprises implement environmental management systems. By the end of 2008, the number of ISO 14001 certificates issued in Poland amounted to 1,544, while at the same time, the number of certificates granted in the Czech Republic was greatly over 3,000. The Eco-Management and Audit Scheme (EMAS) still remains relatively unpopular among Polish organisations. As at the end of 2011, 25 Polish organisations and 32 facilities were registered in EMAS.[48] In contrast, in Germany, there were 14,346 organisations and 1,878 facilities registered in the system in 2011.

Poor participation of Polish enterprises in EMS can be explained by low environmental awareness which is still low, especially among the representatives of the SME sector. The survey[49] of Polish SMEs, commissioned by the Polish Agency for Enterprise Development, confirmed low level of awareness of environmental requirements among the operators. 63% of representatives of the surveyed enter-

[48] http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=0&pcode=tsdpc410&language=en

[49] Potencjał MŚP w dziedzinie kreowania nowych produktów innowacyjnych – rozwiązania proekologiczne, GfK, PBDG commissioned by PAED, 2009

prises have not yet indentified the impact of their activities on the environment, whereas 53% of enterprises have considered their impact on the environment to be negligible, and 36% of enterprises have not found any environmental impact in their organisation. The survey has additionally shown that 22% of Polish SME operators do not know about legal environmental requirements relevant to the activities carried out. Most often this occurs in the case of microenterprises, enterprises with revenue lower than PLN 1.5 million and those operating in the services sector.

Housing sector in Poland should be transformed into sustainable residential construction industry. Excessively scattered buildings, design (especially in terms of architecture) incoherent with local socio-cultural and environmental context and the consequent degradation of space represent only some of the adverse aspects of construction in Poland. Apart from the shortcomings essentially associated with incoherent system which cannot ensure spatial order[50], the housing (existing housing resources in the first place) has a serious drawback, that is high energy intensity. The energy demand of a single-family house is estimated to exceed as much as several times the EU average (150 kWh/1m^2, up to 300 kWh/1m^2 in extreme cases, against 40 kWh/1m^2).[51] The share of household energy consumption in final energy consumption amounts to over 30% in Poland.

Broader application of green public procurement also contributes to the reduction of the energy and material intensity in the economy. The total value of public procurement contracts awarded in Poland amounted to PLN 144.1 billion in 2011, i.e. around 9.5% of GDP, compared to PLN 167 billion in 2010,.[52] This proves that there is large potential in this area and shows the role of the public administration which can and should play an important part in initiating and preserving pro-ecological behaviours to enable the development of products and services meeting high environmental and social standards.

Insufficient degree of the Polish economy internationalisation.

Despite a significant progress towards opening of the Polish economy to the world in the last decade, the potential in this area is not sufficiently exploited yet. Although the fact that Polish economy was relatively less

[50] These issues were tackled in the National Spatial Development Concept 2030.

[51] Murator experts' estimates.

[52] 'Sprawozdanie o funkcjonowaniu systemu zamówien publicznych w 2011 r.', Public Procurement Office, p. 24.

open during the recent world economic crisis helped significantly alleviate the adverse impact of the external demand shock on the economic growth, in prosperous period a wider opening of the Polish economy would enable higher participation in the effects of global development.

The growth dynamics of the scale and level of Polish export modernity over the last decade was driven by the entities with foreign capital whose actual participation in total export has reached over 60%. The activities of these usually large and medium size entities embrace a broad spectrum of various forms of internationalisation. Apart from the absorption of capital, this includes transfer of modern technology and organisation of manufacturing processes, broad use of financial instruments, risk assessment instruments and instruments for protection against risk effects, broad use of access to intercorporate supply networks, co-operation and expansion to foreign markets. Though the share of these entities in Polish export prevails, their influence on the average level of internationalisation of Polish enterprises is not proportional to this share because of their relatively small number.

According to the report of the Institute for Market, Consumption and Business Cycles Research (IBRKK),[53] in the collectivity of almost 50.5 thousand enterprises with employment level exceeding 9 persons, i.e. relatively larger in the whole collectivity of economic entities, only one third of them, i.e. 15.8 thousand, are more or less dealing in export. In 2011, the exports value of these enterprises amounted to over PLN 510.8 billion in total, i.e. almost 91% of total exports (the remaining 9% of exports belonged to exporters from the group of several thousands of microenterprises). However, only for 4.3 thousand of them, i.e. about 27%, exports were the main (almost 80%) source of revenue. Additionally, half of the total number of specialised exporters consisted of enterprises with exclusive or partially foreign capital.

Export and import still remain the most common form of Polish enterprises internationalisation. The survey on internationalisation of the European small and medium sized enterprises[54] commissioned by the European Commission between the end of 2006 and the beginning of 2007 shows 7% share of exporting SMEs, i.e. 1% less

[53] Analysis of the economic and financial situation of enterprises, in particular exporters, 'Raport *'Gospodarka i handel zagraniczny Polski w 2011 roku'*, IBRKK, Warsaw 2012.

[54] *Observatory of European SMEs, Flash Eurobarometer 196 – The Gallup Organization*. The survey covered 17,283 enterprises (including 16,339 from the SME sector) from EU-27, Norway, Iceland and Turkey. 905 enterprises have participated in the survey in Poland.

than the EU average. The highest share of exporting entities was found in Estonia (23%), Slovenia (21%) and Finland (19%), and the lowest in Spain and Cyprus (3% for both). The following was identified as the largest barriers to export for Polish enterprises: poor knowledge of the foreign markets, lack of capital and differences in regulations applicable in other markets. The survey also showed that less than 5% EU SMEs (compared to 20% of large enterprises) are involved in international partnerships in the form of subsidiary companies or joint-venture abroad. Among the Polish SMEs, this proportion amounts to 5.6% and ranks our country 11th in the EU.

In 2011 an increase in the value of Polish foreign direct investments has been noted again. The outflow of net capital from this investment amounted to EUR 5.1 billion. Although the outflow of net capital for these investments was slightly lower (by EUR 312 million) than in 2010, it has significantly exceeded the level from previous years (EUR 3.3 billion in 2009, EUR 3.1 billion in 2008). The increasing values of Polish foreign direct investments underlays certain changes that occur in the Polish economy. It also proves that the potential of Polish enterprises which decide to expand their capital also outside Poland is increasing. Therefore, these enterprises gradually become active participants of the international system of investment capital trading. This fact is noteworthy since it initatites a change in Poland's international investment position. Poland transforms from a recipient of capital located in the form of foreign investment, although still on a small scale, to its source. It is worth highlighting that any foreign investments of the Polish entities are the effect of the enterprises' own actions, i.e. bottom-up initiatives. The Polish entities are able to find, identify and take the opportunity for development on their own in the form of foreign direct investment, though this does not imply that they do not need incentives and help of the competent public institutions.

An efficient start-up or development of business on the foreign markets depends on the availability and effective use of information on the business running conditions on a given market. Enterprises may acquire such information independently or from other specialised units. In the case of many foreign markets, especially those not fully established, Polish enterpreneurs who pursue export or investment activities outside Poland encounter difficulties in obtaining the abovementioned information or in accessing specific market data. The situation is particularly difficult in the case of enterprises which are starting foreign co-operation for the first time, especially in the SME sector. In the case of unexperienced entities, the barriers to the internationalisation process include also excessive diversification of the target markets.

SWOT Analysis

STRENGTHS	WEAKNESSES
• A constitutional limitation of the amount of national debt • Possibility of quarterly tax settlements • Possibility to request general tax interpretations	• High deficit of the public finance sector • High share of statutory expenditure, which limits the freedom of fiscal policy-making • Low leverage of public spending • Complicated tax provisions • Functioning of inefficient tax preferences • Lack of efficient tax incentives for RDI investment and actions
• Stable financing system, including modern and stable banking sector, large capital market, developed leasing market and dynamically developing factoring market • Inflow of EU funds	• Limited access for enterprises, especially for the SMEs sector, to funds for activities and innovation (low specialisation and innovation in financial services for enterprises, limited activity of enterprises in the traded debt market, insufficiently developed credit guarantee and loan fund system, insufficiently developed markets of financing instruments alternative to credit, small scale of VC investment with the advantage of traditional industries) • Significant delays in payments and payment congestions • Poor knowledge about the financing market offer among the enterpreneurs • Poor tendency for external financing of activities among enterprises • Poor usage of the PPP system • Large territorial differences in terms of capital use
• An advanced process of deregulation, derationing, reducing administrative burdens and making economic activities easier (two acts and package for entreprise development)	• High regulatory costs and information obligations for enterprises, especially in the SME sector • Insufficient quality and variability of codified law • Insufficiencies in the process of codifying law in the context of effective mechanisms preventing 'inflation' of law
• High adaptability of enterprises • Relatively high entrepreneurship of citizens • Relatively large market and internal demand	• Low survivability of enterprises • Low adaptability of enterprises, lack of tendencies to take risks in economic undertakings

	• Limited scale of enterprise investments and their intermittent nature • Low proportion of companies relying on formal development plans • Low level of public confidence and lack of traditions and cooperation models in the Polish society; poor co-operation links among the enterprises
• Large number of business environment institutions	• Low uniqueness of services provided by business environment institutions
• Systematically increasing expenditure on innovation activities of enterprises • Significant potential of human capital and level of creativity of citizens as units • High enrolment ratio • High proportion of PhD or Higher Doctorate in R&D staff • Large potential of the academic staff • Active international co-operation of Polish researchers based on EU funds • High research potential of scientific entities, including universities, research institutes and science institutes of the Polish Academy of Sciences	• Low proportion of enterprises spending on innovation, low amount of R&D expenditure by enterprises and low number of R&D staff • Low interest of enterprises in commercialisation of R&D work and in co-operation with the science sector • Low level of gross expenditure on research and development (GERD) in GDP with dominant share of public spending in the GERD structure • High proportion of so called hard infrastructure in spending on innovation activities, at the expense of R&D knowledge • Insufficient coordination of innovation policy between the central and regional level and on the central level itself • Dispersion of actions taken in regions to strengthen innovation and technology transfer, low density of network relations and high formalisation of relations with the environment, leading in overall weakness of regional innovation systems • Poor quality of the innovation support system; institutional solutions not adjusted to the needs of innovative enterprises • Low number of submitted inventions and granted patents (including in EPO) • Significant participation of basic research with the decreasing participation of applied research • Poor inclination of representatives of the science sector to co-operate with enterprises • Fragmented and poor quality research infrastructure

	• Insufficient management and marketing skills among the scientific entities' management staff • High non-wage labour costs • Low level of participation in the labour market and early exit • High proportion of long-term unemployment among the unemployed • High unemployment rate among young people under 25 years old • A relatively high scale of the shadow economy • Limited inter-job mobility • Lack of cohesion between fields of university studies, and the needs of modern economy and of labour market, including too low proportion of technical and exact sciences students • Low indicators of education among adults, including low ratio of continuing education and training • Poor involvement of enterprises in the development of own employees • Lack of systematic forecasts of labour supply and demand – difficulty in developing and implementing actions aimed at reducing structural mismatch on the labour market
• High users' Internet activity among Poles, including trade transactions	• Unsatisfactory quality and availability of information and telecommunication infrastructure • Relatively high costs and low quality of telecommunication services
• High natural and cultural potential	• High energy and material intensity of the economy • Little interest of enterprises in implementing formal environmental management systems • Low ecological awareness of consumers and enterprises, especially in the SME sector • Insufficient emphasis on reduction of material and energy intensity by the enterprises, and small ecological awareness, especially among the SME sector representatives
• Access to the integrating, single EU market and to the consumers with high purchasing power	• Low share of high-tech products in exports

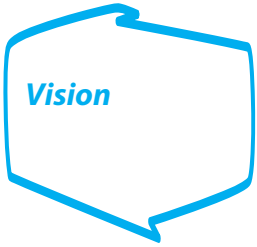
• Relatively high degree of specialisation and export productivity of enterprises with national capital • High potential to attract FDI • High density of basic communication routes	• Insufficient effectiveness of the Poland promotion programmes among foreign investors due to poorly developed infrastructure • Insufficient involvement of enterprises in foreign investment, including development and/or climate aid

OPPORTUNITIES	THREATS
Performance-based budget Simplification and digitising of tax settlements	• Relatively low share of expenditure on development and investments in the national budget • Insufficient progress in reforming public finance and reducing tax burdens, with strong social resistance against budget cuts • Long lasting appreciable effects of the global crisis • Ageing of society, an increasing number of diseases associated with the progress of civilisation and other global social problems
• Further dynamic development of the capital market • Development of public-private partnership • Efficient use of EU support funds for, inter alia, development of infrastructure under the current financial perspective and negotiating a high level of EU financial aid for the period of the next financial perspective • High interest in EU programmes among enterprises • Sectoral structure of EU programmes, thematic concentration of aid • Increasing awareness of the need to limit administrative obligations	• Worsening of the financial situations of banks and pause in credit activity • Deteriorated situation of public finance and limited availability of public funds for financing of enterprises • Risk of limited EU finance allocated for cohesion objectives in the future EU financial perspective • Insufficient interest of the public administration, financial sector and enterprises in financial engineering instruments
• Changed rules of public funds distribution for science and higher education, especially an increase in financing based on competitive selection and pro-quality financing • Development and specialisation of enterprises in the most innovative sectors of the economy	• R&D expenditure kept at a low level and unfavourably structured • Excessive differences in the development level and rate of the regions

• Favourable trend in sectoral economy structure changes manifested by the increasing proportion of high technology sectors • Dynamic development of the infrastructure of science and technology parks • Development of the education and research potential in the fields having decisive impact on the international competitiveness of the economy • Progressing specialisation of Polish researchers • Rapidly growing number of inventions registered in the Patent Office of the Republic of Poland • Increasing role of regions in innovation policy • Efficient involvement of the organisations such as regional development agencies in the strategy implementation system	
• Making the labour market more flexible • Reduction of non-wage labour costs • Breaking the recent trend in an increase of wage differences • High real labour demand shown by the average actual working time of a Polish employee • Attracting highly competent immigrants, including scientists • Increasing quality of human resources through, inter alia, 'soft' projects broadly co-financed by the EU • Increased human resources in the area of science and technology; including a dynamic development of higher education in recent years	• Further stiffening of the labour market and polarisation of employees in terms of working conditions • Increase in non-wage labour costs • Outflow of highly qualified labour force with the progressing reduction of barriers in the free movement of persons
• Experience and significant potential to provide high quality IT services in certain fields and to create smart household appliances • Dynamically increasing e-commerce turnover • Easier application of e-signature	• Insufficient development of telecommunication infrastructure and growing digital exclusion
• An emerging market for so called clean coal technologies • Development of a low carbon economy with a low level of pressure on the environment • Increasing share of 'green' public procurement • Increasing need for high quality services related to leisure management (e.g. tourism, sport) and medicine	• Drop in the competitiveness of Poland as well as high economic and social costs incurred for implementation EU policy of low carbon economy (including carbon leakage) • Increase in production costs due to environmental requirements established at the international level to reduce greenhouse gas emissions and due to increasing prices of energy carriers

• Increasing attractiveness of the country along with tightening integration with the EU and improving reputation of the Polish economy • Dynamically increasing level of trade • Increasing involvement of foreign investors in the area of FDI	• Rapid depletion of Poland's previous competition advantages (especially in the form of relatively low labour costs) • Poor rate of economic development of main trade partners, especially from EU-15 • Increasing competition for Polish products and services on the European market • Increasing competition from developing countries • Inflow of FDI to sectors characterised by low share of 'high technologies' and increasing attractiveness of other countries for FDI

Vision, Main Objective and Horizontal Rules



Open and expansive economy with new jobs on the offer, based on mutual trust and co-operation of the economic life participants, and growing in a sustainable manner based on innovations and highly efficient use of resources, which will ensure improvement of living standards of society and competitiveness of enterprises on the international arena by 2020.

Analyses[55] show that at the stage of growth stimulated by innovations the society reveals high level of education whereas the country is characterised by a high efficiency of management. Countries with growth stimulated mainly by innovations are at the stage of a knowledge civilisation: they have an effective institutional system supporting the development of knowledge intense production of goods and services, a developed transport and communication infrastructure, high level of human capital, efficiently functioning commodity and production factor markets and high technological readiness.[56]

In operational terms, Polish economy will ultimately (2020) improve its position in international innovation rankings. It will be displaying all features which qualify for the group of 'innovation followers' countries according to the Innovation Union Scoreboard, and with the Global Competitiveness Report in mind – Poland will be classified in the group of countries with innovation indicators above the EU average.

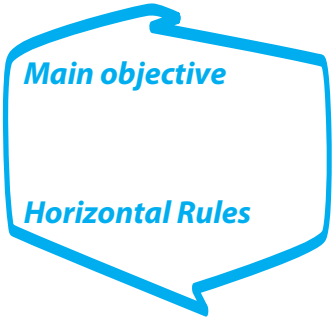
The comparison of indicators from the last Innovation Union Scoreboard survey (February 2012)[57] shows that Poland is still far behind many EU countries in the area of innovation measures. Poland falls behind in the areas such as joint publications of the public and private sector, R&D expenditure of enterprises

[55] *Schwab K., Porter M.E. (red.), The Global Competitiveness Report 2008–2009 , World Economic Forum, Geneva 2008.*

[56] Płowiec U., Refleksje o innowacyjności Polski w perspektywie 2020 r., [in:] Ekonomista 5/2010, Wydawnictwo Key Text, Warsaw.

[57] *Pro Inno Europe, Inno-Metrics, Innovation Union Scoreboard 2011, The innovation union's performance scoreboard for research and innovation, 7 February 2012.*

and patent regisitration. This proves that establishment of a legal framework and general conditions resulting in high involvement of the private sector in innovation investment and in various forms of co-operation to take advantage of the research results is priority A poor innovation level is also confirmed by the Global Competitiveness Report[58] which places Poland on the 22nd place among the EU Member States in terms of the value of the innovation indicator, and on the 25th place in terms of the technological readiness indicator. The measures of the Strategy will be concentrated on the areas which determine partial indicators of the mentioned indices. It should be emphasised that, apart from influencing the areas mentioned, achievement of significant improvement in the area of innovation will largely depend on the Poland's economic growth rate in the perspective of Strategy implementation.



Highly competitive (innovative and efficient) economy, based on knowledge and cooperation

Implementation of the Strategy will be guided by horizontal principles at each level of its functioning and in each area.

Creating knowledge

An important method for recovery from the crisis and provide foundations for future development consists in increased investments in human capital. Creating knowledge consists in establishing conditions for **continuous search of new solutions**, strengthening the cognitive functions and for research work. Thus, the needs of clients could be better satisfied but new products and services, also of intangible nature, could be identified and developed. Creating knowledge is also one of the conditions for an increase in the management efficiency. Under the measures aimed at improving the teaching standards (implemented mainly through the Human Capital Development Strategy) investment in the material infrastructure of education should be increased and the education and training policy should be

[58] *The Global Competitiveness Report 2011–2012 , World Economic Forum*, Geneva, Switzerland 2011.

reformed in order to develop competence necessary for functioning in the environment of knowledge-based economy and efficient and sustainable use of natural resources.

Partnership cooperation

An appropriate level of **social capital** is required for cooperation based on trust, and a point of departure for development of modern economy. Meanwhile, the surveys show that Polish society still relies on passive adaptation rather than on development and innovation. Measures aiming at improving this situation (through interventions of the Social Capital Development Strategy) will also greatly affect the improvement of the economic situation of the country in the long-term. Not only confidence of enterprises in each other is important, but also of all economic life participants (e.g. public administration, business environment institutions, scientific institutions, the judiciary). The form of co-operation to be selected is a side issue compared to the existence of co-operation itself and depends, inter alia, on the adopted objectives, scope of co-operation, significance for competition advantage and on the level of mutual trust and rivalry.[59] Co-operation also includes those relationships which cannot be expressed in a formal framework – e.g. long-term buying and selling relations or social networks, i.e. a social context of the enterprise co-operation. **It is essential to establish multilateral contacts with various partners from the local environments, inter alia, conducive to the identification of the smart specialisations in a region.**

Additionally, in the era of growing competition and increasing consumer demands, **professional development of the relationships of enterprises with the business and social environment and building their reliability and reputation** become, next to financial efficiency and the quality of offered products and goods, essential elements of competition advantage development. The need for the use of the economies of scale and for shortening the life cycle of products induce companies to cooperate, to form partnerships and alliances.[60] Therefore, measures will be taken to support dialogue with stakeholders, to improve reliability of enterprises in the eyes of clients

[59] Cygler J., Co-opetition – new type of relation between competitors, [in:] Organizacja i Kierowanie 2007/2

[60] Koźmiński A. K., Zarządzanie w warunkach niepewności, Wydawnictwo Naukowe PWN, Warsaw 2005.

and to strengthen co-operation in local communities, inter alia, with the help of social economy entities.[61] Therefore, political agreement leading to the reduction of excessive administrative burdens for business will become easier (within the framework of so called voluntary agreements).

Social dialogue is an extremely important matter for implementation of the partnership principle. It allows easing social conflicts and also attempts at achieving fairness in the sphere of goods distribution and socio-economic policy making. This also involves efficient communication in the area of public policies along with recognition of knowledge, expertise and experience of entities other than national by public entities. It is necessary to properly identify and resolve current problems. It is found that the 21st century business is increasingly aiming at long-term, sustainable development of economic organisations while building competitive advantage encapsulated in the process of social dialogue.

Implementation of 'Social Capital Development Strategy' which will refer to areas such as: confidence in public institutions, citizen's attitudes, social consultations will provided a basis for this principle.

Efficient allocation of resources/closed loop management

Resource efficiency is the key to increasing the efficiency of the Polish economy and thus to improving its competitiveness. Rational use of the means of production allows not only to reduce production costs to a minimum. It is also associated with striving at proper allocation of knowledge, competences and skills, e.g. by developing eco-innovation, creating so-called green jobs, or eco-industrial parks and clusters that accelerate innovation processes and support identification of niches with comparative advantages and facilitate commercialisation of research results. This horizontal rule is based on the term of closed loop management that makes reduction of losses in flows of materials and energy and also knowledge and invention possible. It is particularly important in the case of measures aimed at building sustainable, low-carbon economy and ensuring energy and resource safety, at the same moment maintaining protection and sustainable use of bio-diversity.

[61] Social economy entities contribute to building social capital and to the improvement of competitiveness of the economy through mutual mechanisms and diversification of the service providers market

Strategic management/responsible leadership

The surveys show that only a very low percentage of enterprises in Poland have more or less formalised strategic plans. This shows a clear lack of looking forward, i.e. assuming development based on appropriately planned resources and analysis of market tendencies. Long-term thinking should be an approach specific not only for enterprises, but also for institutions from the business environment in a wide sense. In order to drive innovation prior formulation of long-term goals for the development of a given society (enterprises, municipalities, regions, the country) corresponding to its aspirations, **also in the process of identifying technologically advanced specialisations of a given region and establishing technological leadership**, is needed. It should be strengthened by a **responsible leadership** that is one of the prerequisites behind success in implementing a strategy of an enterprise and administration. Responsible leadership is also needed in management of social and environmental issues, in the so called **Corporate Social Responsibility** (CSR). Responsible leadership also relates to public administration and is necessary to set a direction of necessary reforms and to implement them.

Specific Objectives and Lines of Measure, Measures

Analysis of the situation in diagnosed area along with an evaluation of strengths and weaknesses has led to the identification of specific **objectives** presented in the box below, account taken of development trends. Achievement of these objectives which are linked to a greater extent with each other will result in achieving the main objective. An appropriate intervention under the Strategy, i.e. **the lines of measure and the relevant detailed measures**,[62] has been assigned to the objectives.

Objective 1. ***Adjustment of the regulatory and financial environment to the needs of innovative and efficient economy***

Objective 2. ***Stimulating innovation through increase in knowledge and labour efficiency***

Objective 3. ***Increased resource and raw materials efficiency***

Objective 4. ***Increased internationalisation of the Polish economy***

[62] At the end of each line of measures there is a synthetic table of implementation, which shows: **the number of the measure, the responsible bodies** (usually several institutions – mainly ministries – responsible for preparing specified solutions and for their implementation to the legal order, e.g. Acts, government programmes), **participants in the implementation process** (including institutions responsible for implementation, but not being formally responsible for preparing solutions and for the legislative side; this group does not include units, which would serve as beneficiaries of given measures, e.g. business entities – provided that these units do not participate in the implementation), importance (highlighting the most important measures for the implementation of a given line by recognizing a measure as important or key). The last column serves to show the existence **of links with other integrated strategies.** In the majority of cases, these links are in the form of entries which compliment each other.

Objective 1. Adjustment of the regulatory and financial environment to the needs of innovative and efficient economy

Efficient business operation, productivity and development of enterprises, thereby their competitive position, are largely dependent on the institutional environment. The Polish law still changes too frequently and the provisions sometimes are imprecise, ambiguous and not adapted to the changes in equipment and technology. Besides, despite deregulation measures taken in recent years, the provisions place excessive administrative adjustment burden (regulatory costs) on enterprises. Thus, provisions which hamper economic activity or considered as such dissuade some enterpreneurs to be active or adversely affect efficiency of management. Therefore, the Polish legal system still needs to be simplified, and elimination of needless burdens and barriers to entreprises (also in information flow) and systematisation and protection from unjustified changes are required. It is essential to put more emphasis than previously on a thorough analysis of the impacts that the regulation makes on the economy as a whole, not only on the national budget. An elaborated Regulatory Impact Assessment should provide a basic platform for the debate on social and economic benefits and costs of the proposed regulation. The matter of better legal regulations has been presented in the Efficient State Strategy (ESS). Nevertheless, the Strategy for Innovation and Efficiency of the Economy assumes measures supporting ESS interventions in this respect since the quality of economic law significantly affects the conditions for business activities.

Certain legal regulations, e.g. regulations on protection of intellectual property or taxation,[63] can hinder technology transfer and limit the possibilities of co-operation. The extent to which the potential of innovation may be exploited largely depends on the existing tax provisions and rules which release (or constrain) and steer business activity. In turn, the law stability allows strategic decisions to be made both by natural persons and enterprises. However, the tax system largely depends on the changing economic and social conditions. And the changing legal environment (including that of the EU) make it in turn necessary to adjust tax provisions in the most transparent and functional way. In this regard, an im-

[63] Related to complicated settlement of costs and results of co-operation, not offering incentives for co-operation, see: Report: Bariery współpracy przedsiębiorców i ośrodków naukowych, Ministry of Science and Higher Education, Implementation and Innovation Department, November 2006, and Balcerzak A., *Efektywność systemu instytucjonalnego a potencjał gospodarki opartej na wiedzy*, [in:] Ekonomista 6/2009.

portant challenge for the tax policy is to increase competitiveness of the tax system, including the context of support for innovation. The Strategy provides for the measures in this area of national policy.

Stable currency, clear rules of fiscal and monetary policies or low and predictable inflation represent other elements which establish a proper framework for pursuing and planning the economic activities of enterprises. The state of public finance has impact on the government ability to participate in the investment and pro-development undertakings, especially in the areas such as education, health, research and development (R&D), innovations or energy and transport infrastructure. Discipline and transparent rules in the area of public spending are the basis of sustainable economic growth. The role of macro-economic policy consists in working out the fiscal and monetary framework of the economy so as to make the conditions for saving, investing and working most favourable to the development of the economy.

One of the more vital actions in the field of public finance safety consists in introducing changes which will, first of all, contribute to the reduction of fiscal imbalance and then to create space for improving the structure and efficiency of public expenditure. Modern planning solutions in the field of budget procedure and multiannual planning, based on performance budget system, help improve the transparency, efficiency and organisation of the public finance sector in Poland along with the rules of its functioning.

Management of the public finance sector debt is another important matter in public finance impacting macro-economy. The aim of debt management is to minimise the costs of debt service in the long term with established limits for the refinancing risk, currency risk, interest rate risk, national budget liquidity and other elements, especially credit and operational risk and the distribution of costs of debt service in time.

One of the elements of institutional environment improvement, at the same moment achieving the principle of efficient allocation of funds, will consist in increasing the efficiency of using State Treasury assets and greater transparency of the rules regarding the functioning of public property in the economy. This measure will include, inter alia, privatisation processes, also with the participation of workers or local authority bodies, and making the management staff of state-owned companies more professional. The concept of citizen and employee share-ownership will be supported.

The measures in the mentioned areas of national policy – associated with the stabilisation of public finance, budget planning and managing State Treasury assets – fall within the scope of the Efficient State Strategy.
Nevertheless, their efficient implementation is necessary to increase the possibility of a pro-development (especially pro-innovation) allocation of public funds allocation enshrined in the Strategy.

For the costs of development or purchase and implementation, which significantly exceed the capital capabilities of most enterprises, especially with the risk linked to them, are a barrier to implementation of innovative solutions in enterprises. Therefore, the Strategy covers the structure of public expenditure and innovation financing. The strategy assumptions provide for concentration of national and local public expenditure on pro-development purposes (which will not only increase the level of innovation of the economy, but also overall efficiency of public expenditure) and for establishment of a comprehensive system for financing innovation, based on private capital in the first place, but also on public-private and public capital, in order to increase the scale of investment in new technologies made by enterprises (especially SMEs).

High R&D expenditure is inherently linked with the notion of innovation economy. However, they do not guarantee effective use of new technologies or acceleration of GDP growth per capita. Therefore, they are not sufficient to increase the innovation level of the economy, although they provide essential support. National development stimulated by innovation also requires an efficiently functioning management system. Therefore, one of the most important elements which ensure high quality of the economic environment is an administrative system which takes into account the interests of all entities active in the sphere of economy. To this end, it must be based on the real needs of clients, coordination of actions, efficient communication to improve relations between the administration and enterprises or to enhance the system of economic judiciary and enforcement of rights (especially rights under agreements). The basic condition for improvement of the quality of services provided by the administration, communication with the external environment and reduction of the operational costs consists in more extensive use of information and communication technologies in contacts between the public administration and citizens, enterprises and entities outside of the public sector. National policy in all the above mentioned areas is covered by the Efficient State Strategy.

Significant meaning in achieving objective 1, but also other objectives of the Strategy, should be attributed to socio-economic dialogue which also is strongly reflected in the horizontal rule of 'partnership.' Development of appropriate solutions, especially of legislative nature, as well as their further implementation, will not be possible without reliable discussion with representatives of both employees and employers. Therefore, the socio-economic dialogue should be strengthened through:

- ensuring partner relations between the administration and citizens, enterprises and socio-economic partners,
- strengthening social supervision of the implementation of national policies by increasing the role of dialogue bodies,
- improving the exchange of information between the social dialogue parties,
- increasing participation of the economic environment and society in economic policy making.

Lines of measure within objective 1

1.1. Adjustment of the economic regulation system to the needs of efficient and innovative economy

1.2. Concentration of public expenditure on pro-development and innovation measures

1.3. Simplification, cohesion and transparency of the tax system to meet the needs of an efficient and innovative economy

1.4. Easier access to capital for enterprises at all stages of their development, with particular emphasis on high-risk capital and the SME sector.

Description of lines of measure within objective 1

Line of measure ***1.1. Adjustment of the economic regulation system to the needs of efficient and innovative economy***

Changes that have been launched in the legislative process of the legal system need to be continued to ensure that the law will always be based on analytical evidence; needless provisions will be eliminated; regulatory costs as well as the barriers in pur-

suing economic activities will be reduced. Implementation of this line of measures will consist of the following:

ACTIONS PROVIDED FOR IN THIS RESPECT INCLUDE ESPECIALLY THE FOLLOWING:

1.1.1. Adjustment of the provisions of law to improve the conditions for economic activities, including simplification of the law and reduction of regulatory costs – this will be achieved through continuing reviews of the existing law and analyses of the potential for simplification carried out in co-operation with social partners (economic organisations). Deregulation measures will be continued. It will be necessary to develop simplifications that support exchange of information with the administration, including integration of administrative information systems in respect of statistical standards and their adaptation to the needs of users in terms of the scope and timeframes of data availability. Emphasis will be placed on that the body of the administration acquires as much data as possible via electronic means or using information possessed by other bodies of the administration[64] to reduce regulatory costs incurred by enterprises. Actions taken will be aimed at eliminating gaps and barriers in provisions of economic law. It will be essential to identify regulations hindering innovation and limiting the freedom of economic and investment activities, such as: recognition of private contributions financed from EU subsidies as public contribution to a spin-off, acceptance of cash operations as the basic form of settlements with the option of a non-cash settlement or regulations in the criminal code concerning mismanagement. Actions intended to simplify and facilitate procedures will also cover the area of applying for, receiving and settling EU funds by the beneficiaries.

1.1.2. Creating and implementing solutions for economic analysis of economic law – the main objective of the action is effective and efficient implementation of a regulation policy based on evidence, which guarantees improvement of the regulatory environment by perfecting ex ante analyses in the legislative process and constructing analytical tools necessary for the analysis of existing law. The areas in which interventions will take place are as follows:

– strengthening and improving the system of impact assessments of legal acts for public intervention at a sufficiently early stage of work with particular emphasis on the entrepreneurship and competitiveness impact analysis as a mechanism preventing adoption of regulations which are incomplete, needless, or even detrimental to the economy;

[64] The legal basis for this is the Act of 12 February 2010 on the change of the Act on the informatisation of entities performing public tasks and some other Acts (Article 2 point 22, Dz. U. No 40 item 230) and the amendment of Article 220 § 1(2) of the Code of Administrative Conduct.

- implementing the SME test into the economic impact evaluation of newly established law so as allow efficient adjustment of the legislation to the specificity of the SME sector and adopting the most efficient legislative solutions from the view of enterprise development;
- introducing an interim monitoring of economic law (impact assessment of legal acts ex post), ensuring analysis and review of the actual benefits and costs related to establishing a piece of legislation, which is the basis for further work;
- introducing economic self-regulation mechanisms as an alternative regulatory mechanism, based on voluntary obligations of enterprises for improving the functioning of the economy;
- tightening co-operation in policy-making with direct policy addressees with special emphasis on SMEs, by using modern cutting edge information and communication technologies (online consultation tools);
- developing tools enabling analysing administrative burdens, adjustment costs and financial costs in terms of the arduousness of provisions of economic law;
- analysis of regulations in the key socio-economic areas in process terms to identify legal gaps and so called bottlenecks, to optimise the process and to evaluate the adequacy of the adopted solutions to the specificity of the area.

1.1.3. Preventing bankruptcy and the new chance policy – the main objective of the measure is to increase the viability of enterprises by (1) using preventive instruments against the difficulties in pursuing economic activities, (2) proliferating the use of legal tools for protection and restructuring of economic activities, especially the law on restructuring, (3) ensuring efficient use of the law on insolvency – as a tool for rescuing, restructuring and efficient (but only as a last resort) liquidation (allocation) of resources, and also (4) by creating conditions for renewed pursuit of economic activities by once azbankrupt enterprises.

The areas in which an intervention will take place are as follows:

- preventing crisis situations for enterprises (early warning systems),
- preventing bankruptcy of enterprises (non-judicial forms of repair and restructuring),
- efficient commencement of bankruptcy of enterprises (judicial forms of restructuring and liquidation),
- a new chance (debt relief, actions after declaring bankruptcy of an enterprise, renewed pursuit of economic activities),
- promotional actions (an information and promotion campaign for promoting good management and a reasonable approach to the subject of bankruptcy).

In order to reduce the scale of enterprises bankruptcy and to increase their viability rate it is also necessary to quickly transpose the renewed EU directive on late payment (2011/7/EU). Furthermore, the efficiency of the fiscal policy on preventing late payments (possibility of VAT correction) will be verified.

Table presenting how the line of measures 1.1. is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
1.1.1.	MoE, MF, MJ, CSO	CPM, enterprise organisations, PAED, scientific entities	1	ESS
1.1.2.	MoE, CPM	GLC, enterprise organisations, scientific entities, local authority units, PAED	1	ESS
1.1.3.	MoE, MJ	enterprise organisations, National Council of the Judiciary, inter-resort team (inter alia MoE, MJ, MF, MRD, MT) PAED, scientific entities	2	ESS

** 1 – key; 2 – important*

Line of measure ***1.2. Concentration of public expenditure on pro-development and innovation measures***

The necessity to increase spending efficiency in the light of the high debt of public finance sector and to achieve the objectives laid down in the Europe 2020 Strategy and flagship initiatives, especially in the Innovation Union initiative, requires a greater share of pro-development expenditures in public spending. Therefore, the following measures will be required:

1.2.1 Increasing public expenditure and stimulating private expenditure on R&D (research and development) actions – in line with the objective set out for Poland under the Europe 2020 Strategy implementation by 2020 (meaning when the strategy is in effect) the Gross Expenditure on R&D (GERD) should reach 1.7%

GDP. Therefore, priority will be given to a systematic increase of public R&D expenditure, both from the national budget, as well as from the support received by Poland for this objective under the cohesion policy. It will be also necessary to create mechanisms stimulating enterprises to increase R&D expenditure, so as to increase the share of the private sector in R&D financing to at least 50 % in 2020.

1.2.2 Adapting the structure of mechanisms and increasing efficiency of public RDI (research and development and innovation) financing – in the light of a significant budget limitations in implementing the Strategy and private capital mobilisation, measures for more efficient spending of public funds allocated to RDI financing are necessary, in particular an increase in financing based on competitive (objective) selection and increasing the efficiency of subjective financing, implementing a research management system, based on parametric evaluation and audit, and also strict correlation of financing from public funds and research results. In the longer term, the scale of non-reimbursable intervention instruments should be limited. Greater significance than previously should be attributed to reimbursable financing in developing support programmes, excluding research (mainly basic), cross-cutting (radical)[65] and social innovation and those undertakings, areas or project stages for which analyses and evaluations exclude market form of support. The main stream of financing will be based on instruments addressed first of all to private entities for concrete projects, including absorption of modern technologies. Co-financing of investments by the state in a public-private partnership system also inscribes itself within these principles, especially those investments which result from identification and establishment of partnerships in the area of strategic technologies and global socio-economic challenges.

1.2.3 Identification and supporting development of areas and technologies with the largest growth potential – as a necessary additive to the horizontal innovation policy in line with the concept of intelligent specialisation.[66] It is a process of searching for scientific and technological areas to concentrate mea-

[65] Different from growing innovation – inventions with large socio-economic significance, whose gradual improvement and proliferation causes significant economic, social or cultural changes – after Wierzbicki A.P., *Innowacje przełomowe i powszednie,* [in:] Polish Information Society Newsletter 2(52), 2011, also compare: Rogut A., Piasecki B., *Główne kierunki polskiej innowacyjności. Podstawowe czynniki warunkujące kreowanie i powstawanie innowacji*, expert's opinion for the Ministry of Regional Development, 2010, p. 15.

[66] See European Commission, Innovation Union Competitiveness report 2011.

sures and public and private funds on. This process consists in identifying (also in regional terms) science and technology fields implementation of which ensures or will ensure relative competition advantage or greater growth potential in comparison with other economies, as well as tackling the most important social challenges for Poland in the medium- and long-term.

Due to the fact that it is difficult to foresee future effects of investments in the area of research and innovation, whereas the development of technologies and the innovation are more often the scientific results of various, initially not aligned domains, top-down selection and directing investments to narrow areas of science and economy can reduce the potential for development of new technologies and innovation and result in erroneous strategic decisions. Therefore, the basic form of implementing intelligent specialisation of the Polish economy will be a bottom-up form, resulting from the involvement of all stakeholders, especially enterprises, technological platforms and clusters.

Focusing on specific intervention areas requires all stakeholders (inter alia the government, local governments, enterprises, scientific entities) to have a clear vision of the future, based on awareness of the country's/region's strengths and knowledge of the state of research and development in other hubs around the world. Therefore, concentration of expenditure on research and innovation will be based on evidence-based policy, i.e. a policy which would take advantage of the results of foresight-type projects, analysis of scientific, technological and economic specialisation, and results of research and evaluations regarding science and innovation policies. Evidence-based policy will be supported by the development of tools and a system for cyclical evaluation of the national scientific and technological potential and monitoring national and regional specialisations (e.g. the National Foresight Programme – implementing results[67]).

[67] http://npf.gig.eu

National strategic framework for intelligent specialisation

The need to identify intelligent specialisations (to select endogenous competitive advantages, strategic areas of specialisation) at the national and regional level results from Poland's obligation to meet an ex ante condition specified by the European Commission as a prerequisite to receive support for development of the R&D sphere and enterprises from EU Structural Funds for 2014–2020. Therefore, work has been started at the central level to lay down the national strategic policy framework in the area of research and innovation for intelligent specialisation.

The documents indicating national specialisations in research and innovation are as follows:

- *Polish Roadmap for Research Infrastructures,*
- *National Research Programme,*
- *and results of foresight projects, especially of the 'Industry Technology Foresight – InSight 2030'.*

The *Polish Roadmap for Research Infrastructures* (PMDIB) is the Polish contribution to the development of the European Research Area, especially European research infrastructure. The PMDIB covers 33 projects selected by national and foreign experts in the course of a competition. These projects fall within the idea of creating research centres consolidating the national research potential in a given domain, which should involve strong research teams, having the appropriate national and international achievements. The organisational concept of centres involves the principle of open access to research equipment based on the scientific perfection criterion.

The *National Research Programme* (KPB) indicates the strategic directions of scientific research and development work, which specify the objectives and aims of the country's long-term science, technology and innovation policy. The objective of KPB is concentration of public expenditure on priority directions of scientific research from the viewpoint of Polish society and the international competitiveness of Polish economy. KPB was adopted by the Board of Ministers on 16 August 2011. The KPB draft was prepared by the Science Policy Committee and subjected to inter-resort agreements and public consultations. The KPB covers seven strategic, interdisciplinary directions of scientific research and development work. These directions are:

1. New energy technologies
2. Diseases of affluence, new medicine and regenerative medicine
3. Advanced information, telecommunication technologies and mechatronic technologies
4. Modern material technologies
5. The natural environment, agriculture and forestry
6. Social and economic development of Poland in the conditions of globalising markets
7. National safety and defence

The highlighted directions include inter alia:
- global challenges faced by modern society,
- global development tendencies,
- results of the National Foresight Programme 'Poland 2020',
- analysis of the need for scientific support conducted by the National Centre for Research and Development in 2009 among the leading sectors of industry in Poland,
- results of the National Scientific Research and Development Work Programme, established in 2008.

Based on the KPB, the Board of the National Centre for Research and Development prepares strategic research and development work programmes. The Board consists of 10 representatives of the economic, science and administration environments, which ensures the participation of all interested environments in decisions related to other initiatives. The following criteria are used for selecting strategic research and development work programmes:
- long-term needs of the economy,
- level of research in national centres in a given domain,
- the development potential of innovative sectors of entrepreneurship in the micro-, small- and medium-scale based on new Polish technologies,
- priority directions of research development enshrined in European research programmes.

Industry Technology Foresight – InSight 2030 is a project specifying areas and industrial technologies, whose development by 2030 will become the driving force of Polish economy and will contribute to increasing the competiveness and innovation of Polish industry. Analytical work was conducted

in 10 horizontal research fields within which 35 areas (so call leading markets) and 127 key technologies were identified, with the verified list contained 33 areas and 99 technologies grouped into the following research fields at this stage after public consultation and meetings with representatives of individual industries:

1. Industrial biotechnologies
2. Photonics Technologies
3. Microelectronics
4. Advanced manufacturing systems and materials
5. Nanotechnologies
6. Information and communications technologies
7. Cogeneration technologies and reasonable energy management
8. Natural resource acquisition technologies
9. Healthy society
10. Green economy

Cross-analysis of the priorities highlighted in the PMDIB, KPB and InSight 2030 project has shown significant synergy and complementarity in the identified key ares for the national level and confirmed cohesion between the identified areas of scientific and technological specialisation.

The ongoing work will consists in further analysis of the InSight 2030 project results in order to reduce the number of priority technologies and areas, analysis of existing clusters and analysis of the support provided to sectors of the economy and domains of science under OPs and regional OPs (ROPs). Also, a cross-analysis of the potential national and regional intelligent specialisation will be carried out (in the context of strengthening and complementing regional specialisations). Furthermore, the dialogue with stakeholders on identifying the emerging national and regional specialisations will be continued with the support of tools and system for cyclical evaluation of the national scientific and technological potential and monitoring national and regional specialisations (e.g. the National Foresight Programme – implementing results).

The identified areas of specialisation will be used in applying already tested or developing new support instruments, implementing the intelligent specialisation strategy. An example of such instruments are strategic research and development work programmes resulting from the KPB

(e.g. STRATEGMED), programmes supporting key technologies from the viewpoint of national economy (e.g. GRAFTECH), and instruments using bottom-up initiatives of technology platforms and clusters, and based on the mechanism of public-private partnership in the field of financing research and technology development (e.g. InnoLot).

1.2.4 Supporting various forms of innovation – the Strategy assumes a broad definition of innovation, hence public funds will be engaged in actions in all sectors (including the public sector) and branches, both industry and services, including all types of innovation undertakings such as: product, process, organisational, marketing, technological and non-technological, eco-innovation, social innovation, open or user driven innovation (also in creative sectors). Apart from that, public funds will be used for financing R&D activities, including basic research, pursued by scientific entities and enterprises (supporting creation of R&D centres in enterprises).

1.2.5 Supporting knowledge transfer and implementing new/modern technologies in the economy (including environmental technologies) – co-operation between the R&D sector and the economy is the most important mechanism of an efficient innovation system. Therefore, among the objectives of rational public funds spending there is a support for co-operation between enterprises and co-operation of the R&D sphere with enterprises (bonuses for joint research and development work), support for establishment of consortiums for development of innovation and support for local initiatives aimed at establishing science and technology parks and strengthening their co-operation with clusters. The basic principle of supporting co-operation platforms will consist in focusing on bottom-up and regional initiatives. The State's actions in this respect will be mainly supportive (financial and technological) in relation to the function of the idea-initiators and organisers environment and will be focused on the permanence of undertakings.

1.2.6 Efficient management of public programmes in the area of RDI – along with appropriate structure, lines, territorial diversification and manner of involving public funds in investment programmes, it is necessary to ensure achievement of the intended results in the financial, economic and social dimension. Hence, the necessity to adopt objective-based management of public programmes, to focus on their sustainability and real effects, to ensure complementarity of various support programmes, to establish partnerships with economic and social organisations and representatives of beneficiary groups, and to make the procedures of formal evaluation more flexible at the stage of applying and implementing programmes

with an increasing level of conditionality of support. In order to reduce the phenomenon of doubling results, R&D and innovation projects will be implemented using public funds and will be preceded by appropriate analyses, determining their uniqueness in global technology, including by so called patent research, especially in areas, where using patent protection is a popular practice (e.g. pharmacy, biotechnology). Moreover, programmes and projects financed from public funds will be subject to systematic evaluation.

Table presenting how the line of measures 1.2. is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
1.2.1.	MF, MSHE, MoE, MRD	Scientific entities	1	
1.2.2.	MoE, MSHE, MF	Enterprise organisations, PAED	1	ESS
1.2.3.	MSHE, MoE, VEB	Scientific entities, enterprise organisations, local authority units	1	ESS
1.2.4.	MSHE, NSC, NCRD	enterprise organisations, business entities, scientific entities, PAED	2	All integrated strategies
1.2.5.	MSHE, NCRD	enterprise organisations, business entities, scientific entities, PAED	1	
1.2.6.	MSHE, NSC, NCRD	Voivodeship executive board, local authority units, enterprise organisations, business entities, PAED	1	ESS

** 1 – key; 2 – important*

Line of measure ***1.3. Simplification, cohesion and transparency of the tax system to meet the needs of an efficient and innovative economy***

A fiscal system which fosters innovation, efficiency and investment should enable implementation of long-term business strategies and minimise distortions in resource allocation. In line with adopted assumptions the evolution of the tax and social security system in the coming decade – as the entire economic legislation – should consist in further gradual simplification of the existing tax provisions, heading for cohesion and transparency and reduction of the costs of fulfilling tax obligations with ensuring compliance with EU law.

ACTIONS PROVIDED FOR IN THIS RESPECT INCLUDE ESPECIALLY THE FOLLOWING:

1.3.1 Reducing non-wage labour costs in the long-term – OECD surveys unambiguously confirm that tax on consumption and property is the least detrimental to economic growth, while tax on labour incomes and incomes of legal persons is the most detrimental.[68] The demand to reduce non-wage labour costs is also included in the 'Agenda for new skills and jobs' of the new EU Europe 2020 Strategy.[69] With the slower economic growth of Poland's main trade partners and constantly high unemployment rate in the country the evolution of the Polish tax system must head towards a structure of burdens with the smallest adverse impact on the growth and non-wage labour costs. This will help increase labour market participation and implement the Europe 2020 strategy objective to achieve an employment rate of at least 75% for persons aged between 20 and 64.

1.3.2 Eliminating harmful subsidies and rationalising tax reliefs – in line with the methodology adopted by the Ministry of Finance, The Polish tax system includes 489 instruments with tax preference characteristics which correspond to 5.2% of GDP.[70] A large number or preferences present in the Polish tax system and the relevant burdens to public finance (e.g. in relation to GDP) combined with the social and economic benefits which are not always obvious make it necessary to conduct an in-depth review of these instruments. Therefore the Strat-

[68] *Tax and Economic Growth – Economics Department Working Paper No. 620*, OECD 2008.

[69] Europe 2020 Strategy, COM(2010) 682 EN: 'An agenda for new skills and jobs' measure 4.1 improving framework conditions for creating jobs, p. 21.

[70] Report entitled Tax Preferences in Poland, Ministry of Finance, Warsaw 2011.

egy assumes a thorough analysis of the existing tax preferences, which will be used during work on rationalisation to focus preferences more on conditional tools, especially related to innovation activities (see next measure), investment and demographic and environmental challenges.

1.3.3. Rationalisation of the system of fiscal incentives supporting RDI activities – the current system of fiscal incentives associated with research, development and innovation activities is not popular among the taxpayers and does not lead to an increase in innovation of Polish economy, fostering to a greater extent the purchase of new technologies from the outside instead of using tax preferences derived from in-house innovation activities. It is necessary to verify the mechanisms existing in the Polish legal system to develop a more efficient model of supporting innovation undertakings. Regulations that are ineffective should be replaced with simple incentive mechanisms for enterprises that take risk related to R&D activities and to the introduction of new technologies.

1.3.4 Adapting the system of goods and services tax – the current number of VAT regulations, chargeability to tax and the degree of ambiguity of provisions present a significant administrative and financial burden to enterprises. Despite favourable changes in this area that were made in Poland in the last three years, there are still circumstances and possibilities to significantly reduce the number of value added tax regulations and to simplify them – in line with the EU Green Paper on the future of VAT.[71]

Currently, there are ongoing works on the simplification of existing VAT provisions regulating matters regarding specifying chargeability to tax.

[71] *Green Paper On the future of VAT – Towards a simpler, more robust and efficient VAT system,* SEC(2010) 1455 final.

Table presenting how the line of measures 1.3. is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
1.3.1.	MF, MLSP	Tri-partite Commission for Socio-Economic Issues, enterprise organisations, NGOs	2	ESS, HCDS
1.3.2.	MoE, MF	Scientific entities, enterprise organisations, NGOs	2	
1.3.3.	MSHE, MoE, MF	Scientific entities, enterprise organisations, NCRD	1	
1.3.4.	MF	Enterprise organisations	2	

** 1 – key; 2 – important*

Line of measure ***1.4 Easy access to capital for enterprises at all stages of their development, with particular emphasis on high-risk capital and the SME sector***

Access to financial resources is the key factor at every stage of an enterprises' development – from establishment, through development, to restructuring or change of business profile. Sources of financing used for increasing competitiveness, expansion and new technologies underpin the presence of the enterprise on the market, particularly in the current reality of progressing specialisation and intensive searching for new market niches. At the same moment, availability of access to the basic form of external financing, i.e. a bank credit is a significant problem especially – according to the so called financing gap hypothesis – for the smallest and medium-sized enterprises.[72]

Uncertainty caused by the economic shocks, constant lack of confidence in financial markets and regulatory restrictions introduced in the banking sector have strengthened the already important position of own capital in the structure of

[72] Compare Compare Gregory, B.T., Rutherford, M.W., Oswald, S., and Gardiner, L., An *Empirical Investigation of the Growth Cycle of Small Firm Financing*, Journal of Small business Management 43(4) 2005, p. 382–393.

financing investment in Poland in recent years. In the longer term, this position is strengthened through the traditional aversion of enterprises to taking risk related to formal obligations. In this context, it should be emphasised that in the nearest future economic policy-making will still depend on the necessity to enhance stability of the banking system through international regulations (changes in the regulations of the Basel Committee and in the CRD[73]), and also on the relevant amendments of the national legislation resulting in possible adverse impact on the availability of credit.

In the case of innovation measures, access to financing is even more difficult. Due to limiting the risk and balancing assets structures, banks are not well suited to financing of undertakings of a higher than average risk, with an uncertain (in time and value) rate of return. Despite this Polish banks provide more credit and other financial instruments for financing innovation than all other segments of the financial market altogether. This is a result of insufficient development of alternative institutions specialised in supporting innovative solutions.
Therefore, the priority in developing the financial market will consist in enhancing availability of external funding sources for enterprises and expanding the financial offer for undertakings and entities from the area of research and innovation, both based on private and public-private capital. Based on Poland's and other countries' previous experiences, the relevant measures will consist in developing specialised systems and financing instruments on the one hand and in greater use of the current potential of banks and mechanism already functioning in this area, such as the New Connect share market and the Catalyst bond market on the WSE, on the other. The intensity and internal structure of measures related to increasing access to financing and supporting innovation with public funds will be diversified in territorial and functional terms (see measure 1.2.6).

1.4.1 Supporting the processes of savings mobilisation and capital formation – formation and mobilisation of the national capital is of key significance, aside from attracting foreign capital, for the growth of investment in the economy, in particular in innovation actions. To this end, measures encouraging saving and investing are necessary, such as minimising the relevant administrative and tax burdens or promoting long-term saving, especially for housing, health or pension purposes.

[73] The Basel Committee lays down requirements and definitions regarding, inter alia, risk-weighted own funds of banks; CRD – see p. 10.

It is necessary not only to further increase the proportion[74] of persons using basic financial services, but also to support non-cash turnover and to implement innovation in the financial sector through legislation and organisation to make its offer more attractive for the current and potential clients (i.e. increasing the intensivity of using banking services by new segments of clients). Adjustment of the functioning conditions of co-operative banking sector, inter alia, in respect of territorial limitations of activities, the principles of control and the administrative burdens will help increase financial activity on the local level. Adjustment measures will be previously analysed in terms of both their impact on the conditions of activities and the stability of the entities in this sector.

To enhance the system of financing enterprises and innovation, it is necessary to establish a cohesive system of evaluation and monitoring of real economy entities demand for external financing sources, also in regional terms, to properly identify financial gaps. This is strictly connected with the development of SME statistics and regional statistics planned in line of measures 1.1.2 and 2.2.5.

It is necessary to enhance market activity of the public bank, i.e. Bank Gospodarstwa Krajowego (BGK), inter alia, by expanding its activities based on the assets of the State Treasury. The capital base accumulated within the framework of the investment vehicle managed by BGK will allow to use both the currently inactive public capital and to mobilise private capital through a leveraging mechanism, at the same moment giving the opportunity to the development of public-private partnership.

This partnership is an important instrument for mobilisation of private capital, not only into infrastructure undertakings, but also innovation. However, its use on a broader scale requires the PPP formula to be defined more precisely in an Act of appropriate rank which introduces uniform definitions and interpretations of provisions, broader use of stepping stone co-financing agreements with the implementing institution before choosing private partners, developing a system tool for resolving conflicts, clear rules of conducting checks and implementing training of personnel of control bodies, public and local administration. Basing these actions on an analysis of best practices and case studies should reduce officials' reluctance to make decisions (also resulting from fear of being accused of corruption), increase the flexibility of tender procedures and shift the weight

[74] Which, according to some NBP surveys, currently is 77–78%, compare, e.g. *Ocena funkcjonowania polskiego systemu płatniczego w II półroczu 2010 roku*, NBP 2011.

of control from procedures to project objectives. Simplification of the elements of procedures and checks regarding so called critical moments, i.e. tenders and choosing co-operators, will be a priority.

1.4.2 Development of the loan, indemnity and guarantee system – because the loan and indemnity funds concentrate on the SMEs and their specificity best suits the needs of enterprises linked to innovation activities, it should be considered to regulate their functioning through a legal regulation. It is also necessary to adjust current regulations to the system of indemnity funds, so as they could facilitate involvement in higher-risk undertakings through resolving the issues such as public aid, State Treasury guarantees, portfolio indemnities, re-guarantees for regional funds, facilitations for enterprises with a bad credit history. It should be considered to complement the indemnity and guarantee system with a specialised part dedicated to innovation projects covered by preferences and principles of beneficiaries' participation in capital. Special support schemes in the form of loans and indemnities will be addressed to entities starting their business and being in an early stage of development (24–36 months of pursuing economic activities). They could be financed by new subsidies for indemnity and loan funds or long-term lines of credit for loan funds and subsidising costs of granting loans and new indemnity products of BGK. Also, the development of other guarantee instruments which support undertakings based on public-private partnerships will be considered.
Traditional support under public loan and indemnity funds will be complemented with the development of non-subsidy support initiatives,[75] based on a renewable (revolving) mechanism. Such initiatives should allow a flexible response to the needs of enterprises and re-allocating of funds to instruments which can prove most useful or which are the most essential from the viewpoint of the implemented SME support policy. Actions in this area will lead to an increase in the number and operation range of institutions offering debt financing or facilitating access to such financing in individual regions. However, it may be necessary to adjust these institutions to the specificity of individual regions.

1.4.3. Development of micro-financing system – because of SMEs' limited knowledge of available forms of financing and means of obtaining it, it is necessary to develop a micro-financing system based on one stop shops principle, where enterprises could apply for EU, national and local financing instruments. One stop shop system is already successfully functioning in Poland in the form of National Service Network and may help provide an appropriate basis for de-

[75] Using the experiences from implementing the JEREMIE initiative.

velopment of micro-financing. Developed in cooperation with the investor community, banking sector (particularly with local cooperative banks) and EU funds administers the system would be therefore based on a network of intermediary entities who would offer financial products and services by specialised institutions. The catalogue of micro-financial products and services will be open and will evolve depending on the enterpreneurs' needs and capabilities as well as innovativeness of the capital providers. It will also include in particular the instruments for financing innovative technological initiatives at the testing stage and prior to marketing.

1.4.4. Development and promotion of sources of financing of activity other than bank loan – an increase in their market share is necessary to diversify the offer and increase the complexity of Polish system of financing enterprises and innovation. The most important tasks to achieve this goal include the following:

- technological support for enterprises in the field of using equity and debt financing (dissemination of the New Connect and Catalyst markets along with WSE, and financing potential issuers complex service, e.g. within the National Service Network);
- introducing regulation of the factoring agreement (including adopting a uniform definition of factoring);
- setting up guarantee mechanisms for factoring, forfaiting and leasing enterprises which finance export (particularly of high technology) and innovative products and services trading.

1.4.5. Development of high risk financing system – Private Equity/Venture Capital (VC) still play an inconsiderable role in Poland. The existing involvement of such funds suggests that prospects of their development largely depend on the state policy. Direct interference with operation of funds is not planned, but there is a need for measures aimed at mobilising more resources within VC funds and stronger support for investments in the initial stages of enterprises. The state role in this area could cover taking over a part of the risk from private investors i.a. through guarantee of priority for invested capital payment, coverage of potential fund losses primarily from the state budget (this reduces the private funds freezing duration), initiation of payments by the state or granting an option for private investors to repurchase the state's shares in the funds for the entry price. Optimal share of public funds in each fund will be specified (taking into account

the purpose of the funds) based on enterprise profitability monitoring survey, ex post evaluation etc.[76]

Strengthening of the role of National Capital Fund will also help develop the VC market, particularly its weakest link, namely, investments in innovative enterprises at their seed and start-up stages.

1.4.6. Setting up a system of qualitative evaluation of loan credibility and financial mediation – according to the intentions of the European Commission presented in the interim review of the Small Business Act , SMEs' financial needs require development of a separate system for evaluation of loan credibility by the banking community in cooperation with supervisory institutions and enterprise organisations, based on qualitative analysis to larger extent. Moreover, experiences of many EU Member States show that the effectiveness of negotiations between the borrowers (in particular SMEs) and funding entities can be significantly improved with the assistance of the credit ombudsman. It is therefore necessary to consider the possibility of setting up such an institution in Poland on the basis of experiences from other markets.

1.4.7. Information and training activities – the basic promotional task is to encourage enterprises to use financial instruments (through dissemination of awareness of their impact on the development of enterprises), and the basic educational task – to prepare enterprises to use high-risk funds (through availability of managerial and strategic knowledge). On the one hand, it is therefore necessary to increase awareness of the opportunities to acquire capital among the entrepreneurs, in particular in the area of innovative projects financing (i.e. stimulation of the demand for financial instruments and increase in competences of using them by the recipients), and on the other hand, setting up a mechanism introducing new innovative financing services to the market in the cooperation with supervisory institutions. It can take the form of a programme of cooperation with the financial sector, which would support market innovation and demand for new instruments. It is also necessary to develop coaching services for the entrepreneurs in the area of choosing, implementing and accounting for financial instruments under the innovative project.

[76] The survey so far shows that the chances of a project involving a VC fund are the greatest with public fund share at the level of 1/3 – cf. M. Dietl 'Smart Capital dla innowacyjnych przedsiębiorstw', *Raport o innowacyjności gospodarki Polski w 2010 r.*, INE PAN 2011.

Table presenting how the line of measures 1.4 is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
1.4.1.	MoE, MF, MT	enterprise organisations, NGOs, PFSA, BGK	2	ESS
1.4.2.	MoE, MF, PFSA Office	BGK, VEB, local authority units, enterprise organisations, PAED, BEI (incl. KSFP, PSFP)	1	
1.4.3.	MoE	PAED, enterprise organisations, BEI, local authority units	2	
1.4.4.	MoE, PFSA Office	enterprise organisations, PAED, BEI, WSE	2	
1.4.5.	MoE, PFSA Office	VEB, local authority units, enterprise organisations, PAED, BEI (National Capital Fund, Polish Private Equity and Venture Capital Association, business angels networks)	1	
1.4.6.	MoE, PFSA Office	enterprise organisations, ZBP, VEB	2	
1.4.7.	MoE	PAED, PFSA Office, enterprise organisations, ZBP, NGOs, MSHE, scientific bodies	2	

** 1 – key, 2 – important*

Objective 2. Stimulating innovation through increase in knowledge and labour efficiency

The science sector is one of the pillars of knowledge-based economy which should not be separated from social and economic life. Quite the opposite – it is to contribute to the creation of ready-to-use solutions in the conditions of global, competitive economy, i.a. through the development of applicable aspect of scientific research. Science contributes to the education, especially through the basic and applied research, and is an important component of beliefs and – to large extent – a source of culture, therefore, has a direct impact on creating knowledge society. At the current stage of technological advancement, progress of civilisation is impossible without drawing on scientific knowledge. All other functions of science are secondary to its cognitive role and cannot be fulfilled without keeping close relation to basic scientific research. Thus, it is necessary to raise the level of Polish science by way of complex reforms improving the quality of scientific research which would bring it closer to the economic environment, introduce competitiveness to its financing system and improve the scientific staff's mobility at the national and international scale.

Development trends of highly developed countries show that only building competitive advantage based on knowledge and innovation can guarantee stable progress and new, more efficient jobs. Enterprises which implement innovation are more profitable than those which do not invest in innovation. Innovative enterprise is a smart organisation which generates and implements innovation. Nowadays, the rate of changes in engineering, technology and organisation allows to stay on the market for a longer period only for the enterprises that are capable of introducing innovation. At present, many enterprises, even the smallest ones, find themselves under strong pressure to implement innovation, often in many fields simultaneously (new products, technology, organisation, relations with partners). Since innovation is developed and used primarily in urban areas (mostly in the voivodeship centres and other largest cities) which are characterised by appropriate potential of knowledge, science and economy, development actions within public intervention should be adequate to specific character and potentials of the given territory. At the same time they should take into account regional innovation strategies (RIS), including support for monitoring, evaluation, modifications and updates of RIS, taking into account market dynamics, globalisation processes and regional potentials. It is important to introduce innovation not only into the new branches, but also to search and introduce innovative solutions in the areas of traditionally leading industries of regional or local economies. Nonetheless, in

the longer period it is important to have a diversified economy structure based on the modern services (with the highest value added) and industries and technologies with the highest growth potential. Foresight-type methods should be of high usefulness when determining branches and directions of development.

Development of strategic research trends according to the National Foresight Programme 'Poland 2020' and Technological Foresight of Industry Insight 2030

National Foresight Programme 'Poland 2020' was initiated in 2004 by the Minister of Scientific Research and Information Technology and started in 2006 under the decision of the Minister of Science and Higher Education. The main objectives of National Foresight Programme 'Poland 2020' were: to determine the vision of the development of Poland up to 2020, to determine priority research and development work trends, to apply the results in practice, to adjust Polish science policy to the EU requirement and to shape science and innovation policy in order to develop knowledge-based economy. Research area of the Programme was divided into three research fields, further divided into topics, listed below:

- **sustainable development of Poland:** quality of life, energy resources, ecology, environmental protection technology, natural resources, new materials, transport, environmental policy, product policy, development of regions;
- **information and communications technology:** access to information, ICT and society, ICT and education, e-business, new media;
- **Security:** economic security (external and internal), intellectual security, social security, technological and technological security, development of civil society.

Implementers of the programme decide to use recognised and commonly used research methods in their work: Delphi analysis, PEST analysis (analysis of political, economic, social and technological factors), cross analysis of impacts. On the basis of such a wide analysis, scenarios and recommendations for further development of economy were designed.

1. List of recommended technologies

Apart from the development scenarios the experts involved in the National Foresight Programme 'Poland 2020' drew down a recommended technologies list. These technologies provide an opportunity to implement solutions

for competitive or niche industries of economy because of already accumulated research and development and intellectual capital:

1.1. Unique technological equipment as well as research and measuring equipment for next generation advanced technology

1.2. New generation of construction materials and functional materials as well as surface engineering technologies, including nanomaterials and nanotechnologies.

1.3. Energy-saving construction technologies, exploitation systems and materials for 'smart' residential buildings, public utility infrastructure and industrial facilities, taking into account recycling and environmental protection

1.4. Polygenerational, environmentally safe technologies for integrated production of energy and technological products

1.5. Renewable and alternative energy sources technologies, including ones enabling generating electricity and heat in distributed systems

1.6. Nuclear energy technologies and their hybrids with advanced carbon technologies and solutions using renewable energy sources

1.7. Advanced methods and information technologies shaping competitiveness of the economy, including expert systems of equipment operation, industry processes, communication networks and natural environment state monitoring

2. List of recommended technologies of high development potential

Next, the experts recommended technologies which need support for their development because of high national research and development potential and strategic significance:

2.1. Advanced, waste-free materials technologies and biodegradable engineering materials for industry, transport and power engineering with closed, environmentally safe 'life cycle'

2.2. Advanced materials and technologies for biomedical engineering

2.3. Advanced, highly resistant materials for industry and transport

2.4. Biodegradable, recyclable construction materials

2.5. Highly efficient industrial biotechnologies, sustainable and integrated with nanotechnologies and bionic solutions to apply in various industries of economy, in particular pharmacy, food processing, health protection and environmental protection

2.6. Environmentally friendly chemical products and technologies to process fossil materials, biomass and waste into widely used chemicals and fuels

2.7. Technologically and economically effective systems for the use of domestic fossil materials resources, including in particular the development of clean and highly efficient next generation carbon technologies, which ensure compliance with environmental protection requirements and CO2 footprint reduction
2.8. Innovative methods of recognising mineral resources deposits (including water) and advances technologies of obtaining them, with particular focus on geophysical methods
2.9. New generation of technologies for efficient extraction and use of domestic resources of fossil minerals while ensuring ecological security
2.10. Innovative technologies of environmental protection by means of continuous monitoring and biological methods of purification and controlled self-purification
2.11. Low-waste and waste-free technologies of production and industrial methods of waste utilisation and dangerous waste disposal
2.12. New technologies to reduce the occurrence of particularly dangerous substances in the environment

3. List of research topics recommended for socio-economic sciences

Efficient pro-growth policy requires introspection provided by research in socio-economic sciences. Without them it would be difficult to understand social, cultural and political context of modernisation. However, success or failure of policies and their measures is increasingly dependent on this context. This is why the NFP 'Poland 2020' suggested that social and economic sciences should particularly focus on:
3.1. Study of preferred pop-cultural patterns of Polish society
3.2. Study of determinants of sustainable development – import of ready solutions or self-sustainability
3.3. Study of social, economic, technological and cultural determinants of access to digital goods and services in the '50+' generation
3.4. Study of psychological, social and cultural determinants and consequences of using ICT and widespread use of digital information systems and new media as well as position, model and role of public media in the new media
3.5. Study of development of knowledge-based economy and innovation at the level of enterprises (micro) and the whole economy (macro)
3.6. Study of the obstacles for entrepreneurship, innovation and knowledge-based economy
3.7. Study of the model of economic growth, in particular the role of growth based on classic capital investments and knowledge-based growth

3.8. Study of the processes to reduce technological gap on the basis of technology import (Far East model from the 1960s and 1970s) and development of national R&D sector
3.9. Study of the aging society problems (impact on pension systems, healthcare, labour market)
3.10. Study of the impact of institutional changes on the functioning of Polish economy
3.11. Study of the process of public finance reforms and relations between the scale and structure of expenditure and economic development of Poland
3.12. Study of social implication of the processes of radical economic reforms
3.13. Study of changes in functioning of the EU and Poland's possible operational strategies in the process of the Union reforms

The results of the National Foresight Programme 'Poland 2020' helped determine the directions of science and technology development within the prepared National Research Programme.

Moreover, in 2008 implementation of 18 foresight projects of regional and sectoral extent financed from EU Structural Funds under submeasure 1.4.5 Sectoral Operational Programme 'Improvement of the Competitiveness of Enterprises' was completed. Currently, other 22 regional and industrial foresight projects are implemented under submeasure 1.1.1. of the Innovative Economy Operational Programme. Other such initiatives were and still are started.

Technological Foresight of Industry Insight 2030, initiated by the Ministry of Economy, is the first Polish horizontal foresight project covering all industrial sectors. The main objective of Insight 2030 was to identify **key technologies and competitive industrial areas of strategic importance**, whose development will be a priority for Polish industry during the next 20 years. The aim was to choose the specialisations in the Polish economy, which would allow forming a new industry concept based on knowledge and innovation and, above all, heading towards sustainable development of the economy. Key technology roadmaps and technology atlases were also prepared, and integrated scenarios of the development of Polish industry were drafted. Recommendations from the survey not only concern strategic changes and improvement of coordination in the area of influence of science, technology and system of commercialisation of knowledge, but are

also related to improving of the current infrastructure and technological and financial support, with the focus on the most crucial stages of implementation. The postulates include the following: construction of state of the art pilot testing and demonstration lines to carry out experiments and to design prototypes in the science and technology parks, improvement of the parks operation and development of their technological support, market approach in research project evaluation, establishing Implementation Support Fund based the seed fund principle on Polish capital market, using government procurements to support implementation, and raising the status of university technology development centres.

Competitive industrial areas identified within the fields of research:

Field of research 1 – Industrial biotechnologies

1. Advanced materials manufacturing
2. Innovative technological processes
3. Use of renewable raw materials and industrial waste
4. Health protection

Field of research 2 – Nanotechnologies

1. Manufacturing of advanced materials and materials with unique properties
2. Environmental protection
3. Health protection and manufacturing of pharmaceutical products with no side effects

Field of research 3 – Advanced manufacturing systems

1. Optimisation of manufacturing processes in terms of production quality, product price and use of materials
2. Rationalisation of energy consumption and use of its renewable sources
3. Efficient labour management
4. Improvement of working comfort at production posts

Field of research 4 – ICT

1. Applications in e-business
2. Optimisation of production processes
3. Road safety
4. Economic, civilian and military security
5. Health protection

Field of research 5 – Microelectronic technologies

1. Advanced materials for microelectronic circuits and structures

2. Specialised circuits for white goods, means of transport and production processes control
3. Innovative technological processes

Field of research 6 – Photonics technologies

1. High-tech elements and components for production of technological equipment, household appliances and means of transport
2. New sources of energy
3. Innovative technological processes
4. Health protection

Field of research 7 – Development of clean coal technologies

1. Energy security of the country
2. Emission-free energy management

Field of research 8 – Technologies for rationalisation of energy management

1. Low-energy building engineering
2. Energy efficient society
3. Energy efficient transport, industry and media transmission

Field of research 9 – High-tech equipment for mining industry

1. Enhancement of competitiveness of Polish mining industry through the production of high quality raw materials
2. Ensuring raw material security of the country
3. Safety and ergonomics of processes of obtaining mineral raw materials

Field of research 10 – Innovative technologies of obtaining mineral raw materials

1. Raw mineral security ensured by exploitation of unconventional resources
2. Energy security ensured by making Polish economy independent from imported energetic raw materials
3. Enhancement of competitiveness and efficiency of Polish mining industry

A well-functioning innovation system stimulates demand for adequate qualifications. Development of knowledge-based economy requires actions to be taken to prepare the staff for modern economy. Therefore it is crucial to concentrate activity on improvement of education quality well as on adjustment of the educational structures to the needs of economy, i.a. by applying interdisciplinary approach to teaching; such approach would combine development of business, creative skills and cultural competence.

The necessity for adapt quickly to the changes in the modern world implies the need to abandon the traditional concept of job qualifications as 'competence'. At the same time, due to the fact that the ability to communicate easily, to solve conflicts or to cope with untypical situations is very important for enterprise operation, a need for a new kind of competence emerges that is not associated with technological knowledge gained during education but to the ability to function in a community and to build trust. In order to implement new organisational or technological solutions it is necessary to ensure an adequate level of so-called absorption abilities, which mostly depend on workers' knowledge, attitudes and skills.

As it was mentioned before, a well-developed ICT sector is a very important component of widely understood innovation system – both in the context of modern infrastructure and of the basis of the whole e-economy. Electronic economy (also called digital economy or e-economy) is a wide term for market activities which use information technologies. It includes, among other things, the ICT sector, the internet, content, business processes of all market participants (business, administration, consumers), media (including advertising) and copyright. In technological terms, the ICT sector is a platform for communication and cooperation, which are crucial for development and implementation of innovation. As regards its impact on the economy, on the one hand it is a result of a combination of scientific work and entrepreneurship, on the other hand – it creates the whole new market segments. In a wider aspect it allows transition to the knowledge society by ensuring unrestrained and quick flow of information. Thus, the ICT sector acts as a catalyst for innovation in economy and improves its competitiveness and investment attractiveness.

Lines of measure within objective 2

2.1. Raise the level and efficiency of science in Poland, strengthen its connections with economy and increase its international competitiveness
2.2. Build framework for efficient innovation policy
2.3. Support for cooperation on development and implementation of innovation
2.4. Development of innovation culture and wider inclusion of society into the process of creative thinking and developing innovation
2.5. Supporting the staff development for innovation and efficient economy
2.6. Creation of high-quality ICT infrastructure and development of e-economy

Description of lines of measure within objective 2

Line of measure ***2.1. Raise the level and efficiency of science in Poland, strengthen its connections with economy and increase its international competitiveness***

The efficient knowledge-based economy requires new, in quality terms, relations with the environment, particularly economic, from scientific institutions. Following that line will require implementation of a complex science reform in order to improve cooperation between science and economy as well as a reform of higher education. Strengthening of the cooperation between scientific entities is one of the objectives of the science sector reform called 'We build on knowledge' which was introduced in a package of six acts which entered into force on 1 October 2010.The reform provides i.a. increasing the transparency of science funding system, increasing the efficiency of funds use for that purpose, improving connections between funding and results of scientific research and introducing a state of the art system for evaluation of scientific and R&D activities. One of the goals of the reform is to decentralise scientific research funding system through transfer of funding certain tasks from the competent Minister

of Science to the newly created National Science Centre (its responsibilities include funding of competitions for basic research projects, research carried out by persons who start their scientific career as well as doctoral fellowships and postdoctoral internships) and National Centre for Research and Development (among its responsibilities are: funding strategic R&D programmes, initiating and implementing applied research programmes, popularising the results of scientific research and experimental development). Within the framework of the reform Committee for Evaluation of Scientific Units was established and its responsibilities include evaluation of the quality of individual scientific entities' work; also Scientific Policy Committee was established which is an advisory body for strategic matters related to science. The reform also introduces changes to improve functioning of scientific entities: research institutes and science institutes of the Polish Academy of Sciences. Changes are also introduced in the higher education system. [77]

2.1.1. Support for cross-sector and international mobility of the academic staff – scientists' mobility within the science sector, between the science sector and other sectors of economy and in the international environment will be supported. Within the latter, measures will be taken both at the national (implementation of the Charter for Researchers and recommendations of the European Partnership for Researchers, building the potential for admitting foreign scientists at Polish universities and institutes) and Community level (e.g. supporting measures for development of the EURAXESS system[78]). Programmes supporting transfer of knowledge and best practices from leading foreign research and education centres (e.g. Top 500 Innovators – Science – Management – Commercialisation programme) also will be implemented.

[77] On 1 October 2011, an act reforming Polish higher education system entered into force. It covers, among others, education system reform, introducing a university funding model based on teaching quality, simplifying scientific career path and better adjustment of the universities' educational offer to the needs of labour market. Implementing the above mentioned reforms shall contribute to increase in efficiency and competitiveness of science and higher education sectors (i.a. by establishing a direct connection between amount of public expenditure for research and education with their quality and efficiency), as well as their better integration within the European Research Area and European Higher Education Area.

[78] It is a common initiative of the European Commission and states participating in the European framework programme for research and technological development. The main objective of EURAXESS is to support international mobility of scientists by giving them free of charge, complete and practical information and ensuring that they receive necessary assistance when abroad.

2.1.2.Development of international scientific and educational cooperation, i.a. through the support of the participation of Polish scientific teams and scientific organisations in international research programmes and consortia, support for investment undertakings to create Polish research infrastructure of European scope, support for national entities submitting their inventions, utility models and industrial designs to obtain protection outside the borders of Poland and supporting using international resources of foreign language patent information. Integration with the EU in the area of research and technological development within EU-level projects and undertaking is of particular significance when it comes to international cooperation. Poland should commit itself to initiatives for the development of the European Research Area (e.g. Joint Programming Initiatives, European Research and Innovation Partnerships, European Institute of Innovation and Technology) and actively participate in the European scientific policy making. Measures for promoting the achievements of Polish scientists should be taken. This should be accomplished by mandatory attendance at big science trade fairs organised e.g. in the United States (National Institutes of Health, NIH; The American Association for Advancement of Science, AAAS).

2.1.3. Development of modern academic staff by:

- providing attractive research conditions for young scientists, taking measures to increase the wages of academic staff, which will stop the outflow of young and well educated staff;
- measures for improving project management quality, including raising qualifications of the managers and administrators who are in charge of research and investment projects;
- providing incentives for structured partnerships with business environment, i.a. by promoting skills related with entrepreneurship, management and innovation among students and scientists.

2.1.4. Development of research infrastructure and infrastructure for knowledge transfer through:

- concentrating public expenditure on infrastructural undertakings specified in the Polish Roadmap for Research Infrastructures;
- consolidation of the fragmented infrastructure and support for the projects which integrate the environment, e.g. hardware investments for several scientific entities which form regional and national scientific networks or consortia;

– supporting establishment and use of research infrastructure within research and industrial centres, including clusters, technology parks, and technology platforms (including supporting common research infrastructure within Polish Technology Platforms). It is also important to further improve specialisation of technology parks and rise of their significance as instruments which attract FDI and increase the level of research and innovation internationalisation of Polish regions;
– supporting the development of infrastructure for knowledge transfer within technological parks, research and technology parks, technology transfer centres and technology incubators.

2.1.5. Supporting the development of regional scientific base – in order i.a. to ensure optimal use of territorial potentials, e.g. through the support (via investments and organisation) for the top quality research led by the Polish scientific entities (expressed i.a. in results of the evaluation by the Committee for Evaluation of Scientific Units) and networking them with the leading centres all over the world. Such development should comply with the lines of regional development (or the need for better use of metropolitan functions of urban centres – Warsaw, Cracow, Wroclaw, Tricity and Upper Silezian centres), and the support for development of applied research and technology commercialisation should be combined with regional features of voivodeships. A network stimulating diffusion of innovation and benefits for the economy of less developed regions should be implemented and developed between the scientific units with top quality research and weaker units.

Table presenting how the line of measures 2.1 is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
2.1.1.	MSHE, NSC	FPS, scientific entities	2	HCDS
2.1.2.	MSHE, NSC, NCRD	NCP, FPS, scientific entities	2	HCDS
2.1.3.	MSHE, NSC, NCRD	FPS, scientific entities	1	HCDS, SCDS
2.1.4.	MSHE, MoE	PAED, scientific entities, VEB	2	SCDS
2.1.5.	MSHE, VEB	scientific entities	2	SCDS

** 1 – key, 2 – important*

Line of measures ***2.2. Build framework for efficient innovation policy***

One of the key issues for implementation of measure 2 consists in ensuring appropriate framework for conducting efficient innovation policy. Public administration faces particular challenges, since the lines of measure and financial resources mostly depend on it. Regional level is crucial for the system. Changes in regional innovation system should guarantee internal cohesion of measures taken and an increase in the significance of innovation in regional socio-economic policy. The key to improve the situation will include i.a.: abandoning sectoral and executive approach to innovation policy for a horizontal and comprehensive approach to development of the processes of innovation and technology transfer in the region.

Public procurement to support broadly understood innovation should be an important element of new, pro-innovation approach.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

2.2.1. Strengthening integration between entrepreneurship policy and innovation and scientific and technological policy – it is important to shift public aid from stable industries mature in terms of maturity (with limited growth potential) to the young innovative enterprises with high growth dynamics and development of instruments for new technologies commercialisation. Preferred area of influence includes 1) technological entrepreneurship, 2) modern services entrepreneurship, including creative industries and 3) academic entrepreneurship, conferring positive changes to the science and research sector more dynamic and increasing opportunities for practical application of possessed knowledge. Access to support for R&D and innovation for the SME sector should be definitely facilitated. The support should also cover pilot projects for implementing innovative changes in enterprises.

2.2.2. Improvement in coordination of science and innovation policy at the central level and strengthening the horizontal, interdisciplinary approach to knowledge-based economy – e.g. through appointing a supraministerial body in order to increase the importance of a debate on the significance of research and innovation in the development of Polish economy and to strengthen the horizontal, interdisciplinary approach to knowledge-based economy. The key issue consists in implementing innovation elements to all policies at the same time; the horizontal innovation policy in itself could not achieve anything significant without actions in each area.

2.2.3. Implementing pro-innovative solutions when awarding public procurements by:

– dissemination of information about on the possibility of using negotiation procedures to award contracts under public procurement procedure (competitive dialogue);
– testing and purchasing new solution and technological systems;
– measures to increase participation of SMEs in public procurement procedures;
– promoting the idea of new, smart approach among public services who prepare contracts under public procurement procedure (concept of an intelligent procuring entity which cooperates with the market and informs about their needs early enough).

2.2.4. Strengthening regional innovation policy by:

– abandoning implementation approach (dependent on the use of EU funds) to innovation policy for a comprehensive approach to development of innovation processes and technology transfer in the region. Implementation of this measure will consist in the first place in appointing a unit responsible for shaping innovation policy in the region in each Marshal's Office (or its strengthening – the existing departments of innovation policy or innovation);
– support policy orientation on efficiency and sustainability of measures implemented in the regions – i.e. orientation and subordination of measures on and to the objectives (e.g. co-funded from the EU funds) to efficient increasing of innovation capacity of regional economy. Ensuring long-term continuity of implemented programmes is an important issue;
– concentrating objectives and reducing the number of strategic areas of impact within Regional Innovation Strategies and other strategic document in the region. It is important to select the leading measures which are most significant for establishment of a technology transfer and knowledge commercialisation system (TTKCS) in the region while taking into account so-called smart specialisation. Updates of Regional Innovation Strategies should also follow this direction;
– concentration of resources and competence on strengthening of innovation and technology transfer, e.g. through trial coordination of the activities of institutions operating in regional innovation support systems, attempted by the regional authorities';
– introduction of regional partnership rules for development and maintaining innovation policy, i.e. regional authorities should act as a leader for measures for development of the region in terms of innovation. This is about integration of local

environments (universities, scientific units, enterprises, local authority units, NGOs) and about acting as a coordinator as well as cooperating with international environment. At the same time, formalisation of the relations between regional authorities and environment should be avoided. Networking and developing a regional partnership requires broader delegation of competence to enterprise associations or NGOs under TTKCS. The purpose of these measures is also to develop a model of interaction between innovation policy on the central and regional level. The best practice in this area at the local level can be used while creating general rules;
- support for regional and local analyses of research projects supply for the business, so that the project supply and cost estimates can be appraised in a more realistic than their chances for successful commercialisation could be increased.

2.2.5. Reducing information asymmetry for economic policy and strategic measures in the area of innovation and efficiency in sectoral and regional system by:

- synergy of cohesion policy instruments and research and innovation framework programmes through the measures implementing similar rules of application and implementation of research and innovation projects (though with appropriate level of flexibility maintained);
- building an identification system for technological and innovation needs of enterprises based on cooperation between institutions involved in innovation and technology transfer development processes;
- changes in the system of data collection from public statistics (CSO) in order to take greater account of the SME sector in surveys on innovation;
- measures for wider application of evidence-based policy (speeding up of a procedure of obtaining statistical data which provide the basis for developing policy for the years to come);
- introduction of so-called disclosure rules for foreign R&D investors in Poland (implementation of legal provisions which impose an obligation on the international enterprises operating in Poland to publish information on expenditure on R&D in the country);
- systematic publication of innovation reports (e.g. MSN Scientific Network coordinated by Institute of Economics of the Polish Academy of Sciences in cooperation with the Minister of Economy and accompanying analytical Reports: the List of 500 Most Innovation Enterprises in Poland, in regions and sectors, including the division into micro, small, medium and large-sized enterprises; the List of the Largest Investors in Research and Development; the List of Companies Patenting in Poland);

– support for development of specialist centres of technological audit intended to advise and assist SME in obtaining new technologies or organisational solutions; gathering and analysing available information to determine technological development trends of a given industry in view of market competitiveness of the enterprise; advising on basic data as regards newly created enterprises (i.a. enterprise size, system of ownership, legal principles, evaluation of innovation of the enterprise); developing potential scenarios of development of the enterprise; identifying key technologies for development of the enterprise.

Table presenting how the line of measures 2.2 is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
2.2.1.	MoE, MSHE	PAED, NCRD	2	SCDS
2.2.2.	MoE, MSHE		2	
2.2.3.	PubPO, MoE, MSHE, CPM	PAED	2	ESS
2.2.4.	MRD, MSHE, MoE, VEB	local authority units, enterprise organisations, scientific entities, BEI, NGOs, PAED	1	NSRD
2.2.5.	CSO, MoE, MSHE, MRD, MF	scientific entities, BEI, PAED	2	ESS

** 1 – key, 2 – important*

Line of measure ***2.3. Support for cooperation on development and implementation of innovation***

Innovations usually emerge and are disseminated as a result of cooperation between entities. Intensity of such cooperation is a basic factor of innovation of the whole economy and its development potential. Innovative activity of enterprises and functioning of modern branches require an effective system conducive to the support of relationships between the science and research sphere and enterprises - a system that would effectively match business partners, fa-

cilitate the flow of personnel and forming clusters, and wide access to research infrastructure, both on the national and international scale. Such a system must also offer special conditions to newly developed innovation or development projects. Furthermore, to start cooperation an additional incentive is needed to guarantee protection of results of actions of the entities involved – in the form of efficient procedures of receiving protection of intellectual property on the national and international market, swift flow of patent information and high scientific ethical standards.

Instruments of cooperation support will in the first place aimed at supporting natural processes of starting cooperation between entities. This implies that it is necessary to provide an appropriate environment in which cooperation between enterprises can be initiated in an easy and efficient way. However, such measures will not lead to imposing specific forms, scope and entities with which enterprises should cooperate, but will merely eliminate identified obstacles. Support will also be targeted at the existing cooperation networks.

Clusters play an important role in the context of territorial aspect of development policy. They constitute an efficient mechanism of resources and funds concentration and they are one of the best diagnosed methods of stimulating innovative and horizontal cooperation in economy. By creating conditions for dissemination of development stimuli to other areas, cluster policy will allow fuller use of development potential of regions. Cluster policy should also be linked to development of special economic zones to provide friendly environment to start cooperation between enterprises located in the zones. At the same time, development of clusters can make economic activity within SEZ more dynamic, also after their operation is terminated under the existing legal and organisational formula. One of the effects of SEZ activity is development of industry specialisation, which can be the beginning of sectoral clusters. Such specialisation can make a gmina, poviat or voivodeships stand out against location offers of other regions.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

2.3.1. Promoting cooperation of economic entities and other partners in implementation of development undertakings, including those in the field of R&D and innovation by:

- shifting bonuses (e.g. in the form of grants and subsidies) from individual entities to joint undertakings of a group of entities who cooperate and concentrate their activity on specific types of economic activity;
- promotion of the importance of cooperation, networking and informal alliances for development of the enterprise and good functioning on the market among economic entities. The best incentive is to present the best practices (successful joint undertakings), this why such a joint undertaking will be taken into account by the state policy. Support in this respect can also be provided by NGOs with good position on local markets and local governments. For better efficiency such measures will be combined with the use and dissemination of high-tech communication tools which allow direct communication between people and institutions. Modern technologies allow real-time contact and provide a basis for cooperation between enterprises spatially distant from each other. Measures which take that feature of ICT into account are also an important premise in implementation of objective 4 Increased internationalisation of the Polish economy;
- support for informal contacts between enterprises: support for the existing enterprise associations or promotion of establishing the new ones – such organisations can significantly contribute to development of informal cooperation. Furthermore, it is necessary to support organisation which promote informal contacts (networking clubs) by promoting their activity among enterprises. Education about informal cooperation is also important; it can be delivered through an information campaign in business media, free trainings or school or university education;
- enhancement of SME innovation through the support of innovation diffusion processes carried out by large enterprises or under another type of cooperation for SMEs;
- creating opportunities to make contacts and integrate regional partners (e.g. conferences, study trips, seminars) in the regions, implementation of educational and integrating network projects allowing establishing a connection between partners based on formal and informal links. Setting up industrial and regional centres of competence;
- support for cooperation between university and its external environment in order to: commercialise the results of research, take up initiatives contributing to economic development of the region and adjusting the students' education process to the local and regional labour market's needs.

2.3.2. Supporting the mobility of academic and economic staff by:

- promotion of practical placement in enterprises (including SMEs) for academic staff; introduction of PhD and postdoctoral internships co-financed by the university and enterprises;
- broader use of ICT as a tool for promotion of part-time studies (although possibly with more course hours with similar educational offer), taking into account both the employee's and the employer's interest;
- better access to mobility supporting programmes (e.g. current European Marie Curie scheme as well as the future European Marie Curie scheme, or Fulbright Commission and Foundation for Polish Science, both functioning for a long time) and developing a study tour programme for young PhDs to a research centre abroad. Individuals gaining experience abroad improve their professional activity, get research partners for future, and can work with the best teams in the world;
- flow of employees from business to universities – including practitioners in research projects and educational process.

2.3.3. Supporting cooperation within clusters by:

- promotion of a bottom-up approach to cluster development, i.e. enterprises should be the primary entities involved in the process of building cluster initiatives since they are best integrated with the local market. Public authority activity in the process of cluster development should first of all concentrated on developing an adequate institutional infrastructure in the cluster's environment and offering various aid programmes to support cluster development;
- abandoning the support to sustain in the future cluster initiatives which will not be able to develop without the state support for a point intervention supporting higher forms of functioning of cluster relations, such as internationalisation of a product/service or joint research projects at the EU level;
- introduction of new instruments to support development of cluster relationships within the functioning SEZ. It is necessary to carry out an industry specialisation screening and starting a dialogue with representatives of the enterprises managing the SEZ and developing forms of support which can give the desired effect;
- in order to translate the research results into more innovative and effective industry it is important to improve cooperation between clusters and science and technology parks;
- support for clusters and areas of cooperation though preferences in the access to funds, and creating of technology centres and incubators to answer the cluster's needs and development of technological infrastructure

for the cluster needs.[79] It also seems advisable to include local governments (in case of cross-regional clusters – cooperation of several voivodeships) in measures for adjusting the education system to the cluster's needs within their competences.

2.3.4. Increasing the potential of Polish Technology Platforms – implementing a mechanism for financing of the costs of participation of the platforms' representatives in the working group and expert groups of the European Technology Platforms in Brussels; raising competence of the managing staff of the platform, support for PTP initiatives including Joint Technology Initiatives, strategic R&D work, supporting joint investments.

2.3.5. Developing a system of technology brokers – the task of technology brokers would consist in contacting science and business representatives to identify precisely their needs and to prepare an optimal offer for them. The key issue is to guarantee adequate competence (professional experience in technology transfer and knowledge commercialisation and soft competence, which allow starting and sustain cooperation). Knowledge brokers should have appropriate institutional back-up while their activity should not be limited to the domestic market. Before the rules of target broker system it is advisable to run pilot programmes in the regions.

2.3.6. Increasing development potential and equalising chances of individual centres. Innovation activity is now concentrated in the main growth centres. The state policy objective in this area will consist in improving innovative potential of such centres, so that they could successfully compete on the international innovation and research market. Increasing chances for development of weaker regions should be sought in their functional link with growth centres and cooperation between them, i.a. in the field of science. Such areas can benefit from the development of urban centres based on innovation developed there, improvement employment alternatives, broadening education paths etc. Improvement of transport infrastructure and dissemination of ICT, as well as social infrastructure, including cultural infrastructure, which facilitates development of competitiveness of towns, will make implementation of the measure easier.

[79] Such measures seem most important on the basis of results of the survey by Plawgo B. (research ed.) *Raport Rozwój struktur klastrowych w Polsce Wschodniej*, Warsaw, December 2007.

Table presenting how the line of measures 2.3 is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
2.3.1.	MoE, MSHE, MRD, NCRD	PAED, VEB, enterprise organisations, local authority units, scientific entities, NGOs, BEI	1	SCDS
2.3.2.	MSHE, MoE	scientific entities, enterprise organisations, business entities, VEB	1	HCDS
2.3.3.	MoE, MSHE, VEB, NCRD	PAED, enterprise organisations, SEZ executive boards, scientific entities, local authority units	2	NSRD
2.3.4.	MoE	PAED, PTP executive boards	2	
2.3.5.	MSHE, MoE, NCRD	PAED, VEB, scientific entities, BEI	1	
2.3.6.	MRD, MSHE	VEB, scientific entities, local authority units	2	NSRD

** 1 – key, 2 – important*

Line of measures ***2.4. Development of innovation culture and wider inclusion of society into the process of creative thinking and developing innovation***

Any noticeable improvement in the innovativeness of Polish economy will not be possible without promoting entrepreneurship, creativity and innovation. Appropriate innovation culture should concern every participant of the innovation system. In the light of diagnosed shortcomings it seems particularly important to increase awareness of enterprises in the area of science and cooperation with the science sector, but also to build competence of public administration. Provision of Polish enterprises with additional management and strategic competence is also important for increasing their innovativeness.

Promoting open approaches to innovation among the society, along with clear message about their significance in improving quality of life, can never be overrated. It should be also noted that innovation can be developed in any place and sphere of life, as an answer for practical needs. Broader inclusion of social actors in innovation processes is another necessary condition to improve the quality of public debate on knowledge economy.
In the context of innovation culture, creating, following and using copyright is an important issue.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

2.4.1. Development pro-innovation attitudes of enterprises, in particular those in the SME sector by:

- educational programmes and initiatives aimed at building pro-innovation corporate culture based on relatively high procedural flexibility which accepts the right to make mistakes, awards attempts breake down the patterns, based on stimulation of creative thinking, and emphasising the ability to cooperate and digital competence;
- building innovation awareness and competence of enterprises through initiatives to increase employees and managerial staff's competence (training, study);
- encouraging for the use of modern forms of communication based on ICT that allow networking and favouring informal contacts;
- dissemination of knowledge about strategic management, including encouraging to create formal development plans that allow a look at economic activity from a longer perspective and broader socio-economic aspect (including trends and challenges related to i.a. globalisation and increasing significance of knowledge factor);
- easier start on the market for creative products and services and integration of creative participants of economy from different sectors in innovation processes;
- providing managers of SMEs with skills and knowledge of human resources management – one of the most important tools to stimulate the development of human capital and to use its potential - crucial for innovation development.

2.4.2. Improving pro-innovation knowledge and awareness of public administration by:

- introduction of new pro-innovation education programmes, dissemination of knowledge and good practices concerning efficient measures for innovation, study visits and seminars to exchange experience and gain knowledge on the subject;

– broadening knowledge and competence of employees of central and regional administration, who design and implement support programmes in the field of entrepreneurship, innovation, protection of intellectual property, R&D, technology transfer and new opportunities arising from public procurements.

2.4.3. Inclusion of society and institutions of civil society in the process of innovation development by:

– raising society awareness of innovation significance for improvement of life quality and necessity of partial directing social expenditure to pro-development objectives;
– promotion of culture of entrepreneurship and innovation by taking these issues into account in curricula on each stage of education and leading social information campaigns;
– creating leaders of creativity and innovation by defining models of active learning and innovative and creative solutions for children, pupils, students and adults' learning i.a. by using European models, promoting model solutions in organisation and methodology of teaching and training which facilitate development of creativity and innovation, promoting the best models of non-formal education – which quickly reacts at the needs arising from the development of advances economic projects, including complex products and services;
– identifying leaders of public opinion and including them in the process of promoting pro-innovation approaches and creating trend for innovation;
– broader delegation of competence and tasks of public institutions to social partners, including NGOs.

2.4.4. Building innovative academic entrepreneurship culture by:

– increasing the representatives of academic authorities and administration awareness through promotional actions which highlight objectives, instruments and benefits of activation of academic entrepreneurship – identified with economic activity of people connected to the university and academic spin-off enterprises as well as entrepreneurship of the university itself;
– including modules on entrepreneurship, innovation and commercialisation of technologies in university curricula and involving experienced practitioners in the process of supporting academic entrepreneurship (lectures, teaching, coaching);
– ensuring that university employees receive material benefits for creating intellectual property that can be commercialised; establishing awards for entrepreneurial academics, lecturers and students. Trainings for managerial staff, accountants and lawyers employed in research units in the field on R&D results commercialisation;

– emphasis on the cooperation between universities and their entrepreneurship (academic business incubators and technology transfer centres) with science and technology parks, clusters or venture capital funds structures in regional innovation systems;
– determination of the rules for flexible cooperation between universities and enterprises and between enterprises. Development of law will cover regulating of property issues and ownership of research equipment, intellectual property rights and division of profit from research commercialisation. Cooperation between the sectors of science and business is also possible when developing rules of protection on intellectual property and rules of scientific research results commercialisation.

2.4.5. Efficient use of intellectual property rights and patent and scientific information by:
– dissemination of knowledge on the basic rules of intellectual property protection, but also on building development strategy for the enterprise on the basis of intangible and legal assets and managing copyrights, among the enterprises;
– support for the system of management of scientific research and its results, as well as the use of patent policy as a mechanism for improving the process of technology transfer and commercialisation;
– improvement of the intellectual property protection by universities along with development of the university rules for intellectual property management, including procedures for cooperation with spin-off enterprises;
– support for national entities (including so-called independent authors) submitting their inventions, utility models and industrial designs outside the borders of Poland;
– popularisation of using the patent information in order to avoid copying R&D results and improving their quality;
– promotion of openness in access to scientific publications and databases developed as a result of research financed from public funds, using ICT technologies.

2.4.6. Popularisation of open innovation model – assuming that the enterprise does not have all the knowledge necessary to run innovation activity within its resources, and that not all effects of own R&D activity will be of use in key areas of the enterprise's activity. Open innovations can be a catalyst for increasing innovativeness on enterprises, in particular from the SME sector, although implementation of this model will require close cooperation between entities. Apart from promoting such cooperation between enterprises themselves and between enterprises and R&D area, it is important to popularise open innovation while respecting the rules of protection of intellectual property. This measure will also support consumers' participation in

the process of creating and developing new products and services (User-Driven Innovation, UDI). Because of relatively low recognition of UDI in Poland, at the initial stage the emphasis should be laid on soft measures, aimed at improving awareness of potential 'innovation creators', i.e. users, about benefits from implementing UDI. In particular it is about informative and promotional measures, including i.a. leading an informational and educational campaign about UDI and benefits from its implementation in enterprises, and publishing examples of good practices, organising a number of conferences, seminars and workshops popularising the subject.

Table presenting how the line of measures 2.4 is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
2.4.1.	MoE, MSHE, city hall, MCNH	PAED, enterprise organisations, economic entities, BEI, NGOs	1	SCDS
2.4.2.	MoE, MSHE, MRD, VEB, local authority units	Ministries, PAED	2	ESS
2.4.3.	MNE, MoE, MSHE, MCNH, NCRD	PAED, VEB, local authority units, NGOs	1	SCDS, ESS, HCDS
2.4.4.	MSHE, MoE, VEB	scientific entities, enterprise organisations, business entities, BEI, MCNH, PAED	2	HCDS, SCDS
2.4.5.	PolPO, MoE, MSHE, MJ	scientific entities, PAED	2	
2.4.6.	MoE, MSHE	PAED, enterprise organisations, BEI, scientific entities	2	

** 1 – key, 2 – important*

Line of measures ***2.5. Supporting the staff development for innovation and efficient economy***

Process of education quality improvement requires involvement of many entities which have impact on the education system. From the perspective of the Strategy, employers play a particular role in this area.[80] Adjustments of courses and trainings to the market needs in termes of competence are possible only when the employers (or employees) explicitly determine the type of knowledge and skills they require, and when training companies undertake organisation of such courses (even if they are more expensive and more difficult to organise). Therefore, cooperation between educational and training institutions and business environment is crucial. The employers impact on education system ensures its better efficiency, which in turn increases level of employment of graduates of all kinds of educational institutions. Enterprises can influence the education system through their opinions on the curricula, active participation in the educational process and acting as leaders of entrepreneurship in the region.

Public intervention should be aimed at the reorganisation of learning process to help the graduates obtain key competence, also from the perspective of creating proper conditions for enterprise development – particularly the small and medium enterprises sector. As far as improving competence of adults is concerned, a non-formal system should be supported. Nowadays it becomes more efficient that formal system of continuous education because of its high flexibility and natural approach to learning.

Qualified and highly adaptive human resources require not only direct support in the form of training or counselling, but also measures to better adapt the staff to the needs of modern economy, i.a. by forecasting labour market demand for appropriate skills and competence on the basis of trends on international markets.

This trend which is generally coherent with the 'Perspective for lifelong learning' paper will be implemented through the following measures:

[80] The role of the employers in shaping of training companies' offer can already be observed. There are also certified (because they allow the participants to perform a particular profession), language and IT courses (because of frequent requirements in these areas put by the employers in their offers and inadequate work of schools) – Cf. U. Sztandar-Sztanderska (ed.), *Kwalifikacje dla potrzeb pracodawców Final report, part of the Qualifications Adjusted to Employers' Needs Project implemented by PKPP Lewiatan,* Warsaw, June 2010.

2.5.1. Involving business in the lifelong learning system by:

- promotion of co-responsibility of business for formal and non-formal learning system;
- development of structures responsible for cooperation with educational and training institutions in the community of enterprises;
- development of the culture of continuous learning in enterprises, particularly in SMEs;
- co-development and using National Qualification Frameworks by enterprises for recruitment and training;
- participation of enterprises in institutions confirming quality of qualifications obtained in a way other than formal.

2.5.2. Developing a system of information about labour market needs at the national and regional level – to monitor labour market trends and for better adjustment of the market and enterprises needs and education and employment policy needs. The system should help easy use of information on the competence types required by educational and training services providers. This would be reflected in effects of learning and preparing an adequate offer by educational and training centres. The activity of Graduate Rights Ombudsman will also be a part of this system.

2.5.3. Promotion and development of upgrading vocational education and training by:

- increasing the role of employers' community in defining standards of qualifications and competence evaluation, including the results from system of information about national and regional labour market;
- improvement of the key competence component in vocational education, vocational training for adults and higher education;
- shifting the learning models from leading enterprises to vocational schools and promoting good vocational training models implemented by the leaders of economy;
- allowing improving qualifications of vocational education and training teachers in enterprises.

2.5.4. Improving managerial skills of enterprises, in particular of the SME sector by:

- raising the managerial staff awareness of the significance of intangible assets for competitiveness of the enterprise, the significance of education and competence of the employees as part of intangible assets and importance of education within the enterprise for improving employees' qualifications, including e-learning;

– dissemination of innovative managerial practices in the area of human management (modern forms of recruitment, motivation, teamwork, knowledge management, leadership), strategic planning, standardisation of process management, professionalization of the manager's function, and upgrade of the system of economic change management;
– strategic counselling for enterprises to increase the awareness of necessity of long-term planning and connection between the vision of development and short-term objectives. Lack of strategic approach negatively affects conditions for functioning of entities and results in broadening of areas of uncertainty.

2.5.5. Increasing the emphasis on key competences and cross-sectional and interdisciplinary skills in the process of staff education, covering i.a.: creativity, innovativeness, entrepreneurship, preparations for project work carried out by a team and individually during education and training, ability to formulate and solve problems, forms and procedures of protection of intellectual property, IT skills, mobile technology mastery, environmental awareness (i.e. in the field of climate changes) and promotion of using the knowledge about environmental technologies, foreign language command and lifelong learning.

Table presenting how the line of measures 2.5 is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
2.5.1.	MNE, MoE, MSHE, MLSP	enterprise organisations, VEB, PAED	1	HCDS
2.5.2.	MLSP, VEB, MSHE	enterprise organisations, local authority units, BEI, PAED	2	HCDS
2.5.3.	MNE, MLSP, MoE, MSHE	enterprise organisations, economic entities, VEB, local authority units	2	HCDS
2.5.4.	MoE, MLSP, MNE	enterprise organisations, BEI, PAED	1	
2.5.5.	MNE, MSHE, MoE	enterprise organisations, BEI	2	HCDS

** 1 – key, 2 – important*

Line of measures ***2.6. Creation of high-quality ICT infrastructure and development of e-economy***

Infrastructure affects socio-economic development of the country, particularly as regards communication accessibility. Transport infrastructure (Transport Development Strategy is dedicated to this area) and ICT infrastructure remain important stimuli of economic development. ICT and R&D infrastructures are often considered an important source of productivity growth in economy. Access to ICT technologies significantly facilitates functioning of enterprises, starting cooperation between entities from different regions and zones (economic, scientific, administrative, social) and creates demand for innovative products and services. Generally, it helps disseminate development processes and increases their absorption outside of voivodeships centres. Development of modern information technologies in transport allows better use of features of transport infrastructure.

While infrastructure ensuring broadband internet access is considered nowadays basic infrastructure (its function is similar to basic public services), and progress in quality of digital content and data traffic requires increasing bandwidth, above all there is a need for rapid development of next generation networks, in particular fibre-optic. According to the Digital agenda for Europe, implementation of this objective requires ensuring appropriate incentives for private investments, accompanied by precisely targeted public investment which will not lead to re-monopolisation of the web. Furthermore, it requires adjusting the rules of radio spectrum allocation.

Measures envisaged in the 'Strategy', targeted at the development of ICT infrastructure and digital economy (information technology, telecommunication, electronic media et al.), are strictly correlated with the actions of the European Commission.

Development and operability of broadband access national plans which guarantee achievement of goals related to access, speed and distribution specified in the Europe 2020 strategy while using public funding in accordance with EU legislation concerning competition and state aid, is a specific component of policy, imposed on the Member States by the European Commission.

Adequate quality and access to high-tech telecommunication and information infrastructure is a necessary condition for dynamic development of the digital

market. It is a perspective area of new types of products, services and transactions, responding to demand related to using high-tech means of communication and technology, but also creating new markets of innovative goods and services. The 'Strategy' envisages supplementing the measures related to development of infrastructure for market development with legislative, financial and technological support, which would further stimulate the development.

2.6.1. Creating conditions for investment in high-tech telecommunication infrastructure – the most important of which is to regulate the situation related to access to the web infrastructure created various entities as investors and ensuring funding of the investment. The priority is to support competition among service providers in next generation networks by ensuring that the operators have access to infrastructure, in exchange for flexibility in setting of prices and margins and market segmentation.[81]

Because of above-average risk related to investments in information and telecommunication infrastructure (especially in next generation network), which is the greatest limitation for private capital, public sector must act as an investor of funding organiser. Therefore:

- direct use of public funds will be concentrated on stimulating infrastructure development and removing obstacles for private investments; the basic rule will be maintaining general level of competitiveness of the sector while taking into account profitability of private investments on the regional level;[82]
- access to the capital will be improved through an intensive use of the EU structural funds and mechanisms of the European Investment Bank, while on the national level financial instruments for investments in information and communication infrastructure will be developed within the funding system described in the line 1.4.

Nevertheless, legal regulation of certain technological aspects of telecommunication infrastructure development is important, i.a. by setting out technological conditions which should be met by telecommunication installations in buildings (especially multifamily) and technological conditions met by cable ducts

[81] According to the European Commission Recommendation on regulated access to Next Generation Access Networks (NGA).

[82] According to the Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks.

localised by roads authorities when building or rebuilding public roads. Such measures will reduce the cost of investment for telecommunication enterprises and thus will reduce investment risk and provide another investment incentive.

2.6.2. Supporting wireless broadband networks – which become more and more important, particularly in areas with poorly developed infrastructure or harsh geographic conditions, for satisfying needs for broadband connection services. They become an important factor for ensuring basic broadband access and – partially – and instrument for implementation of the EU objective to ensure broadband (30 Mbps) internet access for all citizens before 2020.[83] Therefore, Polish economy needs quick development of the wireless technology market, which requires:

- good market organisation, i.e. quick grant of rights to use and allowing second-hand trade;
- rational and non-disruptive legislation related to development of base stations, simplifying and quickening the procedures of obtaining permissions and prolonging contracts for already existing stations;
- accessibility of new radio spectrum (such as 2,6GHz or 800 MHz) available and liberalisation of using of existing spectrum (e.g. 900/1800 MHz);

using digital dividend in 790–862 MHz band for new multimedia mobile services.

2.6.3. Creating conditions facilitating e-economy development

On the national scale, computerisation of public administration, reducing digital exclusion and development of information staff and digital competence are most important for development of the digital economy. A proper strategy in the area of modernisation of administration is the Efficient State Strategy which covers i.a. popularising of the specific forms of communication with public administration (development of e-administration) and improving two-way interaction between citizens and public bodies (i.e. ability to submit documents electronically), as well as greater abilities to carry out full transactions (i.e. handling administrative matters wholly electronically). The Human Capital Development Strategy and (partially) Social Capital Development Strategy take up the issue of reducing digital exclusion (i.e. improving access to the web and equipment and increasing knowledge, motivation and skills to use digital technologies), as well as adapting education systems to quantity and quality changes on the labour

[83] Communication from the European Commission 'European broadband investing in digitally driven growth', COM(2010) 472.

market related to dynamically growing demand for ICT specialists and increasing significance of basic ICT competence in other professions and specialisations. Because the digital economy has a cross-border nature, the measures at the EU level are particularly important, since only at this level the obstacles for its development in individual Member States, including Poland. This is why the Strategy for Innovation and Efficiency of the Economy implements EU lines of measures and guidelines for Member States included in the digital agenda for Europe. Measures will include i.a. the following:

- simplification of procedures of investment in state of the art technologies (including increasing of importance of result-based model and lump sum settlement);
- adjustment of legal and technological conditions for the use of electronic signature on the basis of more accessible, modern and compatible technologies;
- access to the content, easier internet transactions, building trust for digital environment, supporting e-services development;
- review and implementation of solutions for complex realisation of transaction in the key areas of economy (e.g. in real estate) by e-services.

In the area of finances and investments the following is planned:

- co-financing of investments in ICT projects undertaken by enterprises;
- development of instruments of loan policy favouring interest in ICT investments, in particular in opportunities to reduce lending rate;
- support for local development and increase in the number of contractors by granting direct support to entities interested in activity in the e-economy sector, e.g. in the area of e-services, while taking into account differences in innovation level in the regions;
- moreover, implementation of technological solutions for complex realisation of transaction by e-services.

Measures in the area of organisation and information are also necessary, i.e.:

- development of a model for informing enterprises about methods and programmes of supporting the ICT sector and other e-economy sectors, support for information flow between entities representing different areas of activity (ICT enterprises, users, administration, R&D and scientific units) about opportunities to implement and develop ICT;
- development of a legal aid system for entities investing in new technologies, and financing ICT application services and counselling;
- promotion of good practices, i.e. examples of enterprises and solutions which were successful because of implementing and using ICT.

2.6.4. Opening access to public information for enterprises and citizens

The government will support development of services based on open access to content and public information by implementing modern legislative solutions, financing chosen projects and making data and resources available for re-use. It is an important element of measures which lead to increased supply and demand for e-services – and thus laying fundaments of digital society.

Administrative support for making data and resources (generated while carrying out public tasks) available is of key importance here. Such information can be re-used by enterprises and citizens to develop innovative services on the basis of publically available information.

This measure supports the intervention of the Efficient State Strategy.

Table presenting how the line of measures 2.6. is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
2.6.1.	MRD, MoE, MAD	enterprise organisations, economic entities, VEB, local authority units	1	ESS, NSRD
2.6.2.	MAD, OEC, MoE	enterprise organisations, economic entities, VEB, local authority units	2	ESS, NSRD
2.6.3.	UKE, MoE, MJ, MAD	enterprise organisations, PAED, VEB	2	ESS, HCDS, SCDS
2.6.4.	MAD, MRD, Head Office of Geodesy and Cartography	enterprise organisations, local authority units, economic entities	2	ESS

** 1 – key, 2 – important*

Objective 3. Increased resource and raw materials efficiency

The aim of such measures is to reduce material and energy consumption in production and services, rationalise water use, increase export of goods and environmental services, as a result of which green jobs will be created.

When access to natural resources is limited, in order to ensure sustainable development it is particularly important to use recycled resources as this can potentially reduce the material and energy consumption index of manufacturing processes. As far as the industry is concerned, it would be necessary to reorganise the production management system and operate in the supply chain in such a way that would maximize the efficiency of processes and limit their material and energy consumption. Undertaken measures should be also oriented at constant monitoring and creating consumers needs.

Resulting from a complex process of mutual social interactions and application of new knowledge, eco-innovations aim at developing new products and processes which significantly decrease the negative impact on the environment and provide a basis for green economy development. Many solutions with potentially significant impact on the environment are already in place, yet they are used in an insufficient way. There are many factors responsible for that, inter alia, a greater tendency to use the existing technologies, price signals promoting solutions less benefiting for the environment, including environmentally harmful subsidies, more difficult access to funding sources and low awareness of consumers and customers. As the demonstration projects and their commercialisation require considerable expenditure, environmental technologies should be perceived as public goods, mainly due to their importance for the areas such as defence, public health or protection against natural disasters.

The issues concerning sustainable development require systemic approach to integrate them into all business functions, e.g. as criteria taken into account when choosing subcontractors in the supply chain, basis of a marketing strategy or objectives of R&D policy. What may be particularly helpful is to extend risk management and internal control processes so that they involve sustainable development aspects in order to make enterprises more reliable and transparent. Development of environmental technologies and environmental services sector may also provide an opportunity to make the export of broadly understood environmental goods and services more dynamic. Apart from traditional forms of pollution manage-

ment, recycling or renewable energy sources development, the role of patents and know-how will also increase. However, the proposed actions should be based on a thorough and verified calculation of expenditure and benefits, in relation to both economic aspects and employment (so called green jobs). The path to green economy must not increase the existing differences but rather provide flexible incentives to build a bridge between them, both at the national and regional level.

The fact that environmental management systems and eco-labelling implementation in enterprises are becoming increasingly popular at both national and regional level will result in a greater ecological awareness and the adjustement of enterprises to environment protection standards. It will also minimise the negative impact on the environment due to a more rational use of resources.

In Poland, an important element of the efficient use of resources may be sustainable construction. It implies not only energy-efficient and less material-consuming solutions, but also taking into account spatial dimension (inter alia, traditional, regional architecture) when planning and designing investments.

Lines of measure within objective 3

3.1. Transformation of social and economic systems towards a 'greener path', in particular reducing material and energy consumption index of the economy.

3.2. Support for development of sustainable building construction sector as the stages of building planning, designing, erecting buildings and managing throughout buildings' whole life cycle.

Description of lines of measure within objective 3

Line of measures 3.1. ***Transformation of social and economic systems towards a "greener path' and in particular limiting material and energy consumption of the economy.***

The way in which Poland manages resources is still less effective than in most EU countries. In order to maintain development perspectives for the economy and face the issue of shrinking resources and the growing cost of their exploitation, it is necessary to reduce the use of natural resources per product or service unit at all stages of production and consumption. The key to achieve this is to change the manufacturing and consumption models, as well as to raise the ecological awareness of the society, including manufacturers especially in the SMEs sector. Positive changes in this respect will gradually increase the efficiency and competitiveness of industry and services and at the same time will limit the pressure exerted on the environment. Transformation of social and economic system into a greener path is also vital in order to adapt to climate changes and challenges connected with climate and energy policy implementation. It is crucial to make Polish economy more innovative and viable, so that Poland could transform itself in the future from the country which incurs significant expenditure on the implementation of strict policy of reducing greenhouse gas emissions (GHG) into the one which is able to gain notable benefits from it. It should be noted that the efficient use of environmental resources consists not only in limiting their use or their recovery, including recycling waste, but also taking advantage of the possibilities to develop entrepreneurship resulting from natural and cultural values typical of peripheral areas.

These lines of measure will be also implemented through Strategy of Energy Security and the Environment (SESE). What is more, this is a leading strategy in respect of, inter alia, energy efficiency, limiting power industry impact on the environment and sustainable management of environmental resources.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

3.1.1. Providing conditions to foster the development of sustainable production and consumption and of sustainable industrial policy by means of:

- promotion of sustainable public procurement, in particular increasing the awareness of and exchanging good practices among procuring entities, contractors and control institutions;
- supporting development and implementation of technological and non-technological innovations for the purpose of sustainable development (process, product, organisational and marketing innovations), including environmental technologies, ICT, environmental management systems, methodology of life cycle assessment (LCA), eco-labelling, responsible marketing;
- strengthening cross-sectoral cooperation in managing environmental aspects in the supply chain and for the purpose of limiting energy and material and energy consumption of the economy, using, inter alia, eco-industrial parks, technology platforms, clusters, and the like;
- performing consumer comparative testing of products and strengthening consumer organisations and watchdogs;
- promotion of sustainable products on the international market, inter alia, by means of including the issues of sustainable production and consumption in the list of priorities of Trade and Investment Promotion Sections and development support and/or climate aid;
- coordinating actions undertaken for the purpose of sustainable production and consumption, as well as strengthening international cooperation (EU, OECD, UN), within, inter alia, National Reference Centre on Sustainable Consumption and Production (EIONET);
- support for actions connected with treatment/use of recyclable resources.

3.1.2. Raising social awareness and level of knowledge on challenges of sustainable development and climate changes by means of:

- structuring content related to sustainable development and promoting the need to include it in the curricula at all levels of education;
- promotion of cooperation and job mobility to enhance concentration of experiences, particularly between sectors such as science, business, NGOs and public administration;
- development of public, private and social education and training institutions, as well as enhanced linking of their offer with the needs on the labour market;

– social campaigns and educational activities concerning sustainable development and climate changes.

3.1.3. Supporting research and export potential in respect of environmental technologies, with particular focus on low carbon technologies by means of:
– support for R&D activities in environmental technologies;
– support for the implementation of the Environmental Technology Verification (ETV) Scheme;
– streamlining the coordination of scientific research in low carbon technologies;
– promotion of export potential of environmental technologies, especially in respect of low carbon technologies with official development aid (ODA) and/or climate aid for developing countries.

3.1.4. Promoting business & biodiversity entrepreneurship, especially in areas threatened by their peripheral location – the opportunity for better use of local environmental and cultural heritage values may be provided by greater support for business & biodiversity initiatives oriented at developing entrepreneurship connected with nature conservation. This potential is still not fully appreciated, as business operations in this area are concentrated usually on agricultural tourism services. This objective may be achieved, inter alia, through the development of: ecological food production, integrated or traditionally processed; consulting services aimed at the implementation of agricultural, environmental, as well as forestry-related programmes, e.g. environmental rehabilitation of grasslands; obtaining and processing primary natural resources, operation of water management systems, irrigations; manufacturing of natural fertilizers and renewable energy sources, etc. There is a need to implement support system (e.g. in the form of Biodiversity Financial Facility) allowing SMEs located in the Natura 2000 areas or using resources in these areas to access commercial credits for investments that can at the same time play an important role in the economic development and biodiversity protection.

Table presenting how the line of measures 3.1. is followed

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
3.1.1.	MEnv, MoE, MSHE, PubPO	VEB, local authority units, enterprises organisations, business entities, scientific entities	1	SESE
3.1.2.	MEnv, MSHE, MNE, MoE, NFEPWW	VEB, local authority units, BEI, enterprises organisations, NGOs	2	SESE, HCDS
3.1.3.	MoE, MEnv, MSHE, NFEPWW	scientific entities, voivodeship executive board, enterprises organisations, business entities,	1	SESE
3.1.4.	MARD, MEnv, MoE	ARMA, VEB, local authority units, BEI	2	SSDRAAF, SESE, NSRD

** 1 – key, 2 – important*

Line of measures ***3.2. Support for development of sustainable building construction sector as the stages of building planning, designing, erecting and managing throughout buildings' whole life cycle..***

Construction and the following maintenance of a building is one of the more energy-consuming, material-consuming and environment-polluting human activities. Therefore, the idea is to minimise this negative impact and for these measures to be effective it is crucial to take into account the above-mentioned issues already at the stage of planning and designing the investment. Construction is also strongly connected with a specific interference in the area. Thus it is important for the construction to be in harmony with local social and cultural, as well as natural environment, and to shape spatial order in a conscious way. Such an approach, it is worth emphasising, considerably increases the value of such environment and has a significant impact on improving the quality of local residents life. Buildings which are aesthetic, functional and matched to their location have also substantial influence on tourism development.

Apart from applying anticipatory approach emphasised in a sustainable construction model, it is also crucial for Poland to decrease the energy consumption of existing building. It must be underlined that construction sector contributes significantly to energy consumption in Poland. Therefore, it is possible to achieve notable savings in this area and in this way facilitate achieving the objectives of Climate Action and Renewable Energy Package. While designing specific instruments supporting energy efficiency of urban buildings, one must bear in mind to make them a part of wider initiatives, like the idea of 'smart cities'.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

3.2.1. Improvement of energy and material efficiency of architectural and construction undertakings and existing resources by means of:

- wide promotion of energy-efficient construction (including passive housing) characterised by, inter alia, compact construction of buildings, good thermal protection, adequate exposition, application of energy efficient window panels and solutions, functional interior design and zoning, effective heat recovery, etc.; this should be accompanied by actions for the development and implementation of innovative technologies, especially solar collectors, photovoltaic cells, combined heat and power schemes, recovery systems with heat pumps increasing the energy efficiency of a building;
- promoting the use of renewable materials which may undergo recovery processes, including recycling, which are safe for health; encouraging to implement, already at the stage of designing, solutions for minimising the use of resources, materials and water, and limiting waste generation, as well as to obtain materials from the locations in the closest vicinity of construction site (limiting economic and environmental costs connected with transport);
- actions resulting from the implementation of the Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings obligating Member Countries to increase the number of buildings with low energy consumption (ensuring the operations of independent and qualified experts issuing energy performance certificates and controlling the heating and air-conditioning systems; introduction of energy performance certificates control system, promotion of energy saving in buildings which results in greenhouse gas emissions reduction);
- improvement of technical condition of the existing housing resources and their thermal modernisation at the same time (exploiting the potential to reduce energy consumption for communal-living purpose is obstructed by excessive technical wear of the existing housing resources what limits the possibility to carry out thermal modernisations);
- broader implementation of ICT-based solutions for energy saving in buildings (intelligent energy metering systems).

3.2.2. Application of the principles of sustainable architecture – which is in harmony with local cultural and natural landscape, and takes into account climate and topography factors. Both the buildings under modernisation and the new ones should be functional and visually integrated with the surrounding space, as well as be durable, useful and beautiful. Promoting regional, traditional architecture is very important and absolutely does not preclude linking regional traditions with modern, functional technologies and materials in an effective way.

3.2.3. Revival of the traditional construction craft traditions – in order to provide equal conditions for the development of industrial construction and traditional techniques of manufacturing in construction sector which meet the growing demand for traditional architecture and are a necessary element of a cultural landscape. What is crucial in this respect, is to promote education in construction craft which at the moment is rather a matter of amateur individual training than an intentionally supported path of vocational training. Educational system supporting construction craft (and every other one) may play an important part in the activation of unemployed and professionally inactive people, especially in rural areas.

Table presenting how the line of measures 3.2. is followed.

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
3.2.1.	MTCME, VEB, local authority units	scientific entities, NGOs		SESE, NSRD
3.2.2.	MTCME, VEB, local authority units	NGOs		ESS, SESE
3.2.3.	VEB, MNE	enterprises organisations, local authority units		

** 1 – key, 2 – important*

Objective 4. Increased internationalisation of the Polish economy

The activities concerning this objective include export-oriented policies, Polish foreign investments, the policy of attracting foreign investments, as well as consistent promoting Polish economy and the image of Poland.

In spite of the fact that foreign exchange has been growing fast in recent years, over 2/3 of all enterprises employing over 9 people each are not involved in export operations. After a period of steady increase of export to GDP ratio, a decrease was noted in 2007–2009 and it was only in the last two years (2010–2011) when it has started to grow again. Polish export is concentrated on the EU markets and has a very limited share in the third countries markets. What is more, the majority of export operations are undertaken by big enterprises, most often by those with foreign capital. SMEs participate in the volume of export only to a limited extent. There are many factors determining foreign market entry, and in the case of SMEs there are two of them which seem crucial – financial constraints and competence of management staff.

It is, therefore, obvious that transforming the structure of Polish export is crucial for the Polish economy to benefit from globalisation. This is also important to make Polish foreign policy more efficient, especially in areas that are a priority for this policy. The analysis of factors influencing changes of added value share in the revenues of specialised exporters conducted by the Institute for Market, Consumption and Business Cycles Research[84] shows that since the beginning of the past decade there has been an ongoing process of substituting labour costs and national material costs with import-based supply. Therefore, the aim of future operations should be to increase the capacity to generate added value in export production, in particular to design support instruments adjusted to particular groups of addressees. Taking into account the Strategy as a whole, it needs to be noted that there is a distinctive, bi-directional relation between innovation and internationalisation[85]. The ability to function in an international context, and also achieving in this way an adequate returns to scale, is often a condition for innovation implementation to be cost-effective.

As far as the attracting of foreign direct investment (FDI) is concerned, one must bear in mind that FDI may and do play a positive role, however do not guarantee

[84] Expert opinion 'Wartość dodana w polskim eksporcie w latach 2008–2011 i uwarunkowania jej wzrostu' prepared by IBRKK commissioned by the Ministry of Economy.

[85] *Internationalization of European SMEs. Final Report, European Union 2010, p. 72.*

growth benefits on their own. Therefore, the undertaken operations should aim at maximising the process of learning from foreign sources (active policy based on FDI), and the maximum benefits from investments are determined by maintaining local industrial base and promoting links between national enterprises and foreign investors.

The operations are targeted at making Poland more significant in the international economy. For the purposes of the Strategy it is required to internationalise enterprises both in an active and passive way. The former consists in gradual increase of enterprises involvement in the operations on foreign markets, namely from export, through trade network to manufacturing abroad (according to a sequential model of internationalisation). The latter is based on diverse economic relationships established with foreign enterprises without extending the economic activity beyond the borders of a country in which a given enterprise is located.

Lines of measure within objective 4

4.1. Support for Polish export and Polish investments abroad
4.2. Support for the influx of innovative and responsible investments, including foreign investments
4.3. Promoting Polish economy, Polish enterprises and Polish image in the international arena.

Description of lines of measures within objective 4

Line of measures ***4.1. Support for Polish export and Polish investments abroad***

The phenomenon of an early internationalisation among Polish exporters has been confirmed through different conducted surveys (3/4 of tarted export operations within the first 3 years since the moment of setting up their business)[86] – therefore, it is necessary to strengthen this tendency by means of well-targeted pro-export

[86] Project 'Przedsiębiorczość międzynarodowa w Polsce' N115 2566 33, implemented in Kozminski University in 2007–2010.

(informational and promotional) activities in the case of start-up enterprises and to use this tendency to encourage other economic actors to go international. They should be perceived as an example of 'the best practice' for other parties interested in developing their operation in the international environment. The role of the state is to stimulate pro-export orientation of enterprises that should allow them to go through the consecutive development stages at an accelerated pace, until they become mature, significant actors of interenational markets. At the same time, the enterprises-beneficiaries will quickly proceed to an advanced internationalisation. Creating the broadest opportunities possible to support Polish export and Polish investments, especially in the regions worldwide that are vital from the perspective of Polish foreign policy, is equally important.

Because of their demand limits, local markets (or even the national ones) are definitely too small for many business ideas in the area of high technologies to be successfully implemented. Therefore, it is necessary to support internationalisation process of innovative enterprises. Learning from exporting is also an argument which underlines the impact of international operations on accelerated accumulation of knowledge and experience. The development and absorption of ICT technologies and innovations may in turn contribute to significant decrease in additional costs which a foreign supplier must bear (e.g. transport, customs duty, additional administrative costs) and which are not shared by local suppliers. In some fields these costs are minimised to such an extent that they become irrelevant[87].

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

4.1.1. Enhancing the system of the Polish economy promotion by means of: finishing the construction of a system for institutional export support and economy promotion on the basis of the following three cells: the agency assigned to promote the Polish economy – the Network of Investor and Exporter Service Centres (COIE) – a foreign network of Trade and Investment Promotion Sections (WPHI); further development of high quality informational services in respect of export and/or investments beyond Polish borders within the COIE; improvement of WPHI operations (it is important for the new Sections to be located mainly in business and economic centres – and not necessarily in capital cities).

[87] Based on: Cieślik J., 'Internacjonalizacja polskich przedsiębiorstw. Aktualne tendencje – implikacje dla polityki gospodarczej', Kozminski University, Department of Entrepreneurship, Warsaw, November 2010.

4.1.2. Financial support for entrepreneurs activities aiming at developing export operations by means of further extension of the available financial instruments for export in line with the catalogue provided in the OECD Arrangement, including the development of new support instruments for export credits available in other OECD and EU countries; improving the efficiency of export and investment insurance operations of Export Credit Insurance Corporation (ECIC). There is a financial barrier both at the stage of new technologies implementation and production preparation, as well as at the stage of financing and insuring export contracts, especially contracts executed on credit conditions (common in the export operations of the competition from developed countries disposing of extensive infrastructure for export support). As recent studies show[88], financial instruments for export support addressed mainly to SMEs are still used at a too limited scale.

4.1.3. Expansion of the scope of support instruments and their adjustment to the stage of enterprise development –
will involve the following: a quantitative and qualitative diagnosis of export enterprises population; determining dominant export industries, including maps of geographic markets; implementation of export support instruments on the basis of the experiences of other countries, as well as expectations and opinions of Polish enterprises. The analysis conducted on the basis of the experiences of 10 countries[89] shows that what exporters need and appreciate the most are the following contributions, listed according to their significance:

- help in identifying potential trade partners (lack of satisfying solutions in this respect is criticised particularly severly);
- organisation of trade missions;
- funding participation in fairs and exhibitions abroad;
- sector-specific market analyses and marketing studies;
- state's involvement in financing export operations (credits, insurance, guarantees);
- help with managing export formalities (obtaining authorisations and licences, customs duty formalities);
- support in establishing branches abroad and staff recruitment.

[88] 'Analiza funkcjonowania infrastruktury finansowego wspierania polskiego eksportu (KUKE i BGK) w latach 2000–2009-2010, ze szczególnym uwzględnieniem eksportu realizowanego na rynki o podwyższonym ryzyku oraz eksportu MŚP', Expert's report commissioned by the Analyses and Forecasting Department of the Ministry of Economy, IBRKK, Warsaw, December 2010.

[89] They included: Austria, Denmark, Finland, Spain, Ireland, Switzerland, Sweden, Taiwan, Great Britain and Hungary.

The Strategy lays foundations for support programmes prepared on the basis of a comprehensive quantitative and qualitative survey, as a result of which the instruments will be adjusted to the nature of addressees (the size of enterprise, the stage of its development). Dividing enterprises into groups will allow to use more advanced forms of support which will be also adjusted to the particular needs of enterprises. The selection of enterprises will allow inter alia, to identify (1) dynamically oriented entities, namely those which are planning accelerated development and perceive export as a leverage to achieve this target, and (2) enterprises based on advanced technologies, as well as (3) exporters, especially specialised exporters classified as micro-enterprises. Targeted support will allow to avoid fragmentation of efforts which aim is to improve the internationalisation of enterprises.

4.1.4. Supporting the internationalisation process of innovative enterprises by means of developing competences of innovative enterprises staff (used for operations conducted in international markets); support for innovation centres in respect of services in the scope of business internationalisation, including for young technological enterprises; systemic cooperation of innovation centres with the Network of Investors and Exporters' Service Centres (COIE) and network of Trade and Investment Promotion Sections (WPHI). Building the network of contacts with people, enterprises and institutions active on technological markets and using it, inter alia, to actively promote technological achievements of Polish business worldwide.

4.1.5. Using development aid programmes and/or climate assistance to activate Polish exporters by means of fulfilling Polish financial obligations in respect of development aid and/or climate assistance; increasing the untied aid for developing countries to conduct export operations; activating the information and consultancy system by the agency and Network of Investors and Exporters' Service Centres (COIE) providing enterprises with information concerning new development projects (publishing guidebooks which stipulate the conditions of receiving orders from major development agencies worldwide), building the image and position of the donator country in a close link with a given project, similarly as the EU does with the Structural Funds.

Table presenting how the line of measures 4.1. is followed.

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
4.1.1.	MoE	MFA, PIFID, VEB, COIE, PAED, enterprises organisations	1	
4.1.2.	MoE, MF	ECIC, BGK, PIFID, enterprises organisations, PAED	2	
4.1.3.	MoE	PAED, PIFID, enterprises organisations	1	
4.1.4.	MoE	MSHE, PIFID, COIE, BEI, scientific entities, enterprises organisations, PAED	2	
4.1.5.	MoE	MFA, MF, MEnv, enterprises organisations, PIFID, PAED, NFEPWW, NGOs	1	SESE

** 1 – key, 2 – important*

Line of measures ***4.2. Support for the influx of innovative and responsible investments, including foreign investments***

In order to encourage investors to allocate capital in Poland, as well as to draw a bigger attention of international business environments, it is also necessary to focus on promoting Poland as a country which is friendly towards investors, dispose of innovative and creative potential, as well as highly qualified workforce and is an attractive tourism base. To achieve this objective, a consistent policy and synergy is required in promoting Polish economy, culture[90] and tourism.

In order to maximise benefits from investments, including the foreign ones, it is necessary to maintain local industrial base and promote links between national enterprises and foreign investors. As a result, it is also crucial to focus on obtaining investments targeted at national priorities concerning scientific and techno-

[90] Adequate activities in respect of streamlining and enhancing the operation of cultural institutions promoting Poland abroad in order to increase regional competitiveness and provide support for cultured and cultural tourism promotion are planned within the social capital development strategy.

logical development, enhancing highly qualified workforce and above-average renumerated workpositions, as well as facilitating the use of foreign sources to fund national RDI expenditure. An additional incentive to attract foreign investments should be an adequate development policy for investments of polish entrepreneurs and enterprises aimed at international levels.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

4.2.1. Preparation of a comprehensive investment policy of Poland through: indicating industries of the greatest investment and development potential for Poland (including those which generate many jobs) using the results of foresight research and additionaly targeting them with support instruments; developing a code of good practices for dealing with a potential investor; promoting privatisation plans; developing legal framework for foreign sovereign wealth fund and creating good practices of the state receiving such investments; providing incentives for investment and capital funds, including incentives for partners in respect of socially reliable investments; providing incentives for reinvestment of profits in Poland.

4.2.2. Actions for implementation of cluster policy in special economic zones – will cover actions concerning the future of special economic zones, especially reformulating the current cluster policy in order to make business activity more dynamic in economic zones, as well as to provide long-term benefits for the enterprises operating in them. The project will allow for a broader cooperation – regional, beyond borders by means strengthening Polish enterprises as centres of regional networks. Frequent changes in enterprises environment and increasingly shorter life cycles of many products make the market success highly dependent on ability to serve as many customers as possible within a relatively short time frame. Cooperation facilitates and accelerates the process of entering new markets (also in the international dimension), the acquisition of new customers and, as a result, – expansion of the enterprise operations.

4.2.3. Integration of the innovation support systems and support systems for foreign investors – will entail actions involving support for foreign entities operating or intending to operate in Poland, especially reformulating criteria of such support (investments in national research activity, maintaining local industrial base and promoting links between national enterprises and foreign investors, cooperation with local R&D centres as well as universities). Actions will be focused on acquiring foreign investments consistent with national priorities of scientific and technological development. The aim of the intervention in enterprises internationalisation policy is to redefine the Polish model in this respect.

Table presenting how the line of measures 4.2. is followed.

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
4.2.1.	MoE	MF, MFA, MT, PIFID, VEB, local authority units, COIE	1	
4.2.2.	MoE	MF, MSHE, PIFID, VEB, COIE, local authority units	2	
4.2.3.	MoE, MSHE	VEB, PIFID, COIE, local authority units, scientific entities, BEI	2	

** 1 – key, 2 – important*

Line of measures ***4.3. Promoting Polish economy, Polish enterprises and Polish image in the international arena.***

Increasing the importance of Poland in the international economy will largely depend on the promotion system of the Polish economy. A consistent system will allow to promote Polish products and services from key export industries, as well as investments. There will be an emphasis on creation and promotion of products and services, export and investments, the result of which should be a better image of Poland. Only when Poland builds a strong, national reputation in respect of manufacturing specific high-quality products, Polish exporters and manufacturers, by means of reference to the country of origin of their brands, will gain competitive advantage.

THIS LINE WILL BE IMPLEMENTED THROUGH THE FOLLOWING MEASURES:

4.3.1. Concentration of public administration and diplomatic measures on selected markets recognized as the priority ones (on the basis of the survey referred to in measure 4.1.3.), especially be means of: assigning tasks to public administration to be performed on these markets, such as intensifying visits on the government level, working consultations, meetings within the treaty instruments (joint committees, working groups, etc.), intervention at the Community level with the type of intervention determined, government missions, economic missions, etc.; budget and staff enhancement of public entities working on priority markets.

4.3.2. Providing political support for Polish enterprises by means of the implementation of a system for planning government-level visits with the participation of business and regional representatives – the aim is to institutionalise the political support of state authorities for exporters in respect of priority industries, important markets or single, important projects, so that it would be possible during official governemental visits to provide political support for enterprises on specific markets, including interventions. The procedure will plan the schedule of ministerial visits in advance in order to establish contacts with enterprises operating or interested in operating in a specific market, as well as appointing the public unit responsible for interventions. The procedure will also allow to organise joint visits of government administration with the administration representatives of the voivodeship self-government.

4.3.3. Strengthening of institutional and financial support for economic cooperation with the Polish diaspora, especially by means of intensifying cooperation with business organisations and representatives of the Polish diaspora, inter alia, by means of: creating and/or updating the existing 'banks of information' concerning the Polish diaspora enterprises and people of Polish origin with significant economic achievements; framework of cooperation with honorary consuls; development of a mechanism for delegating tasks and funding of chambers of commerce and other Polish diaspora organisations abroad, including economic undertakings with the participation of these chambers in order to expand Polish export.

4.3.4. Establishing greater consistency between measures promoting economy and measures promoting culture, tourism and sport by means of: systemic cooperation through the coordination centre (see measure 4.1.1.) in order to enhance the promotion of economy. The use of the cultural potential and heritage of Poland and national tourism (including cultural, tourism and sport institutions) is essential in the promotion of the Polish economy.

Table presenting how the line of measures 4.3. is followed.

No of measure	Responsible body	Implementation participants	Importance	Link to integrated strategies
4.3.1.	MoE, MFA	PIFID, CPM	2	
4.3.2.	MoE, MFA	CPM, enterprises organisations, PIFID, VEB, COIE, local authority units	2	
4.3.3.	MoE	MFA, MST, PIFID, Polish diaspora organisations abroad, Senate of the Republic of Poland, Polish Community	2	
4.3.4.	MFA, MST, MCNH, MoE	VEB, local authority units, PIFID	1	SCDS

** 1 – key, 2 – important*

Implementation system

In order to examine the policy implemented in the fields stimulating the national development (innovation is one of them), it is required to use a comprehensive approach. Therefore, a national innovation systems should equally include economic, social and cultural aspects. Based on this premise – not only measures provided for in the Strategy will contribute to the innovation policy, but also the implementation of other integrated strategies.

Links between the Strategy and other integrated strategies

	1. National strategy of regional development	2. Strategy for Innovation and Efficiency of the Economy	3. Transport development strategy	4. Energy security and environment strategy	5. Efficient state strategy	6. Strategy for development of national security system of the Republic of Poland	7. Strategy for sustainable development of rural areas, agriculture and fishery	8. Human resources development strategy	9. Social capital development strategy
Objective 1: Adjustment of the economic regulation system to the needs of efficient and innovative economy.									
Objective 2: Stimulating innovation through increase in knowledge and labour efficiency									
Objective 3: Increased resource and raw materials efficiency									
Objective 4: internationalisation of the Polish economy.									

The substantive scope of the Strategy is very broad. The achievement of the main target depends on many factors which have multidirectional and multifaceted influence on each other. At the same time, they are strongly connected with the areas of state's operations determined in other strategies.

The identified weaknesses which have an impact on the efficiency of economic policy determine the introduction of an effective implementation system of a Strategy… based on the public institutions equipped with efficient implementing instruments, including adequate legal and institutional solutions. The system will gain from the best experiences and practices in respect of multi-annual programming of public interventions, coordinating different instruments, monitoring and evaluating, as well as partner cooperation. To that end, the system of the Strategy implementation, similarly to the overall intervention array, is constructed on the basis of previously specified horizontal principles. The nature of the Strategy depends largely on its implementation system, however, one must not assume that the existing system of implementation institutions can be omitted.

The entities involved in the implementation of the Strategy will cover all implementing entities, especially ministers, heads of central offices and government agencies, voivodes, authorities of local government units.

At the same time, one must be aware of the existing deficit in mechanisms coordinating the activities for enhancing innovation in Poland[91], which is necessary on account of the horizontal nature of innovation and the need to provide convergent actions conducted by the entities at the central and regional level. What is therefore required is a better coordination work and activities conducted by ministries responsible for the economy, labour market, competitiveness, innovation, learning, higher education, regional development, culture, education, tourism, health and between these resorts and regional authorities. The Strategy can be successfully implemented in some areas with the assistance of regional institutions which are competitive, 'adequately' localised and adapted in particular regions. An important element of the implementation system will be regional development agencies. They will not only perform the commissioned tasks, but will also ensure that the interventions resulting from particular integrated strat-

[91] The report on the review of the Polish innovation policy entitled 'Policy mix for innovation in Poland – key issues and recommendations' prepared in 2007 by OECD indicated the need in the area of key recommendations to improve the institutional coordination of the process of establishment and implementation of innovation policy.

egies and made at the regional level are complementary and consistent. A potential tasks delegation or a greater involvement of regional development agencies in performing tasks specified in the Strategy for Innovation and Efficiency of the Economy will be subject to arrangements. It is also required to enhance the coordination of the promotion of Poland abroad, so that it is more effective.

The Minister of the Economy, as a coordinator of the Strategy, will be responsible for its overall implementation, however, it does not mean that it will be possible without specific actions undertaken by other members of the government. The Minister of Economy responsibility is to provide conditions for enhancing enterprises innovation. He is also responsible for providing stable and pro-development legal and organisational conditions for enterprises operations, especially for micro, small and medium-sized enterprises. As far as the scope of his competences allows, he implements multi-annual programmes which aim at providing financial support for investments made by entrepreneurs. What is more, he is also involved in the promotion of enterprises and products on foreign markets.

The Minister of Science and Higher Education plays an equal part in the implementation of the Strategy and undertakes actions which aim is to increase the level of scientific research results by means of funding the statutory activity of scientific units, supporting scientific foreign cooperation and providing financial service for acquisition and manufacturing of scientific and research equipment and for construction investments. The Ministry of Science and Higher Education establishes and announces programmes and undertakings regarding tasks which are particularly important to implement scientific, as well as scientific and technical policy of the state, e.g. support programmes for scientists and a funding programme for leading scientific units.

Other ministries are also competent to undertake activities aimed at increasing the level of economic innovation and efficiency. The Minister of Finance is responsible for a broadly understood macro-economic stability of business activity in Poland. The tasks he performs in this respect are mainly targeted at implementing safe, stable and sustainable public finances policy, intending to address as effectively as possible the financial needs of all state policies. It involves tasks connected with initiating, developing, as well as controlling and reporting the financial policy of the state and coordinating the public financial activity. This function covers such areas as: budget policy of the state, public finances and financial institutions. Additionally, the Minister of Finance determines the prin-

ciples of tax policy. The Minister of Treasury undertakes actions which aim is to increase the competitiveness of the Polish economy by changing the ownership structure. These actions involve ownership changes, including especially transfer of shares and interests in companies wholly owned by the State Treasury.

Although the actions of the Minister of Regional Development were not directly determined in the Strategy, they are generally in line with its context. The minister responsible for regional development is held accountable for creating adequate institutional and legal framework for regional policy implementation by contributing to establish a national system of strategic management of development (the essential element of which is regional policy) and for building social support for and involvement in this policy by raising awareness of regional development at the national level.

The Minister of Sport and Tourism supports tourism development by programming and developing legal and economic mechanisms of tourism and supervising the tasks performed to promote tourism on the national and foreign market by the Polish Tourist Organisation within the scope of marketing operations, inter alia, by organising seminars and conferences, participation in fair, organising study tours for journalists. These activities are also undertaken by marshals of voivodeships.

The Strategy also provides details on the activities lying in the scope of competence of the Minister of Labour and Social Policy, Minister of Justice, Minister of Transport, Construction and Maritime Economy, Minister of Administration and Digitization, Minister of the Environment, Minister of Health or requiring close cooperation between particular ministries. The activities for which particular ministers are held responsible will be reflected in annual operational plans of their ministries.

The Strategy was prepared in order to become a part of a broad and consistent development policy. Support system for economy innovation and efficiency **will be provided in details in (operational, development, multi-annual) programmes and policies** entailing an array of activities for achieving the objectives of the Strategy. The relevant instruments will be matched according to specific characteristics of beneficiaries and based on the identified objectives.

In this context it is worthwhile to pay attention to one more dimension of this issue. The process of learning has different speed in individual regions and sectors. Development potential differs depending on the region, and individual sectors have different speed at which they shorten the technological distance between them and leaders. Hence, the conclusion is that individual regions and sectors should embark on the implementation of innovative strategies for technological development at different pace. Therefore, both regional and sectoral innovation systems should be promoted within innovation policy. Sectoral innovation systems should be also promoted, as the nature of knowledge and reasons for market and systemic failure of innovation market are different depending on the sector. The experiences at the international level prove that national, regional and sectoral innovation systems coexist with each other within innovation policy. All the more so as the system covers not only a narrow scope of institutions and organisations involved in research, development and commercialisation of technological innovation, but also: (i) all other institutions and organisations which shape the scope, speed and efficiency of the learning process; (ii) relations and links between the participants of the system[92]. In conclusion, a holistic nature of the Strategy does not preclude the implementation of programmes in which sector-specific innovation was taken into account.

In order to achieve all objectives specified in the Strategy, it is necessary to actually implement and emphasise four horizontal principles, that is **knowledge creation, partnership cooperation, effective allocation of resources/closed loop management, strategic management/responsible leadership**. In order to ensure that the economic policy is effective, and **tasks and undertakings at lower levels of the Strategy implementation are well prioritised**, it is required to implement the recommended principles to the fullest extent.

The documents implementing the Strategy will be evaluated with regard to their compliance with objectives of the Strategy. Additionally, they will be analysed in respect of their compliance with mid-term development strategy of the country and with conditions regarding the structure and basic elements they should include in accordance with the revised Act on the Principles of the Development Policy.

[92] Rogut A., Piasecki B., Główne kierunki polskiej innowacyjności. Podstawowe czynniki warunkujące kreowanie i powstawanie innowacji, Survey commissioned by the Department of Structural Policy Coordination of the Ministry of Regional Development, Łódź, September 2010.

Strategy implementation system should be transparent and the procedures should be limited to the required minimum. It is also important that it should be relatively stable.
Currently, the greatest catalogue of the existing support instruments for innovative operation is included in the 2007–2013 Operational Programme Innovative Economy (OP IE). Above all, OP IE supports investment projects that provide for the creation of new or considerably improved products. Support is granted mainly to investment projects that provide for product and process innovations. Taking into account the time horizon of the Strategy and the practice of a longer deadline for spending measures from operational programmes (n+2), the activities provided for in OP IE will be still undertaken (at least until the mid-term of the Strategy duration).

Under OP IE, support instruments are intended for, inter alia, enterprises, including SMEs, institutions supporting the establishment of innovative enterprises, as well as business environment institutions and networks. OP IE supports the projects which are innovative at least at the national scale or at the international level. The support provided for within OP IE is granted regardless of the sector or industry (with some constraints resulting from the scope of intervention of the European Regional Development Fund (ERDF) and regulations of public aid). Innovation at the local or regional level is also promoted and supported in the Regional Operational Programmes and Eastern Poland Development Operational Programme (inter alia, within priority Axis I: Modern economy).

New operational programmes (within 2014–2020 perspective) will be partially devoted to the areas subject to support from Sectoral Operational Programme "Improvement of the Competitiveness of Enterprises' (SOP ICE) and OP IE. However, they will be mainly dedicated to enterprises which intend to implement innovative projects in the field of R&D, modern technologies, investments with great importance for the economy and application of ICT technologies. The programmes will involve direct support for enterprises, business environment institutions and scientific units rendering high-quality services for enterprises, as well systemic support for the development of institutional environment of innovative enterprises. Actions in respect of product, process, marketing and organisational innovation, which contribute, whether directly or indirectly, to establishing and development of innovative enterprises, will be supported.

At the same time, the Ministry of Economy is finalising the project entitled 'Technological foresight of the industry in Poland InSight 2030' (see: the frame on p. 79-84). The aim of the survey is to verify the development potential of the indicated sectors and industrial areas, identify the competitive industrial areas, as well as key and niche technologies of the future. Foresight results will have an impact on political decisions in respect of providing funds for the areas and technologies of the highest social and economic potential within 2014–2020 financial perspective. The results of the project will be also helpful for enterprises in their strategic planning processes by indicating main tendencies and directions of technology changes in medium- and long-term prospect. Both this foresight project, as well as all others will be integrated within the planned undertaking of the Minister of Science and Higher Education entitled National Foresight Programme – implementation of the results, the aim of which is to develop a system of maps and directions of scientific research and technologies, as well as the foundations of a national monitoring system for foresight projects implementation.

There will be a comprehensive review of the entrepreneurship and innovation support policy within the strategy implementation system, together with the evaluation of the existing support instruments and assessment of the efficiency of the implementing institutions (such as: Polish Agency for Enterprise Development, the National Centre for Research and Development, the National Science Centre, the National Capital Fund, Bank Gospodarstwa Krajowego). The review will also indicate modifications of the existing instruments and analyse good practices from other countries which demonstrate the possibility to implement new innovation and entrepreneurship support instruments into the Polish system. Additionally, on the basis of social and economic diagnosis and the results of the evaluation performed, new support instruments will be proposed. The effects of the above-mentioned review are reflected in, currently under development, Enterprises Development Programme. The programme will also provide a basis for developing operational programmes for the period 2014–2020 in the area of entrepreneurship and innovation, covering both the creation of friendly environment for enterprises, as well as activities aimed at increasing their innovation and competitiveness.

Reporting, monitoring and evaluation system

The implementation of the Strategy will be monitored by the Minister of Economy on the basis of annual implementation reports and monitoring indicators. The aim of the monitoring system is to examine the quantitative and qualitative progress of the implementation of the Strategy objectives, with regard to both purposes and strategic directions of interventions, as well as of the horizontal principles, relevant at every stage of the Strategy development.

Annual reports will be developed on the basis of information provided by ministers (cooperating in this respect also with voivodeship executive boards) and heads of central offices. Additionally, macroeconomic situation and the values of chosen indicators will be analysed. The report will include a description of the activities undertaken in line with the Strategy, as well as of possible problems with its implementation and recommendations for the following period. What is more, the report will include the implementation evaluation of programmes, policies and other documents implementing the Strategy (e.g. Enterprises Development Programme, National Programme for Development of Low-Emission Economy). At the midpoint of the Strategy (in 2015 and 2016), a midterm evaluation is planned to be carried out. During the evaluation, recommendations obtained, inter alia, in the previous reporting periods will be applied. A formal basis for updating the Strategy (as well as other integrated strategies and programmes) will be provided by, inter alia, the Report on socio-economic, regional and spatial development prepared by the Minister of Regional Development.

An integral element of the monitoring of the Strategy will be a base of indicators relating to the main objective, as well as to the individual detailed ones. The indicators will be obtained mainly from official statistics sources. In order to concentrate on the most important elements of the Strategy impact, key and additional indicators have been distinguished. The Strategy includes only the key indicators. They will be reflected in the monitoring reports. At the same time, these indicators will be placed in the electronic, commonly available statistical database established to monitor strategies and development programmes. Additional indicators in turn – which do not have to be formally monitored – will be matched depending on the needs and availability during the preparation of a report. However, it must be emphasised that in many cas-

es the values of indicators for a reporting period (those from the list of key indicators as well) will not be available during the preparation of a report, what regards especially innovation statistics. Therefore, the evaluation of the actual progress of the Strategy implementation will be largely based on the qualitative analysis of the implementation progress.

Regional observation centres will be used to monitor the implementation of the Strategy. Information provided by these centres will be obtained and conveyed by the Minister of Regional Development/marshals of voivodeships. The results of their work may be also used to redefine policies under implementation.

The guidelines on evaluation and analyses of integrated strategies included in the mid-term National Development Strategy 2020 provide for the appointment of an entity responsible for coordination of the whole evaluation process of the development operations.

Indicators for the monitoring of the Strategy for Innovation and Efficiency of the Economy

Lp.	Indicator	Baseline value		Target value		Data source
	Description	Year		2015	2020	
***Main objective:* Highly competitive (innovative and efficient) economy based on knowledge and cooperation**						
1	General expenditure on R&D (%GDP) (GERD)	2010	0.74	0.93	1.7	CSO
2	Position of Poland among EU countries in respect of summary innovation index	2010	Poland among moderate innovators	n/c	Poland among countries keeping up with leaders	Innovation Union Scoreboard
3	Position of Poland among EU countries in respect of indicator of innovation of Global Competitiveness Report	2010	22	19	15	Global Competitiveness Report
4	Resource productivity	2009	0.42	0.45	0.5	Eurostat
Specific objectives						
Objective 1: *Adjustment of the regulatory and financial environment to the needs of innovative and efficient economy*						
5	Government R&D expenditure in GDP (GOVERD+HERD)	2010	0.54	0.6	0.9	CSO
6	Business R&D expenditure in GDP (BERD)	2010	0.2	0,33	0,8	CSO
7	Venture capital investments in undertaking as %GDP	2010	0.034	0.1	0.2	IUS
8	Reduced regulatory costs (accumulated value) as %GDP	2010	0	1	1.5	Ministry of Economy

Objective 2: *Stimulating innovation through increase in knowledge and labour efficiency*						
9	Enterprises introducing product or process innovation as % of a general number of SMEs	2006–2008	17.55	20.0	25.0	IUS
10	Share of high and medium-high technology products in the production sold in the industry (%)	2009	31.7	35	38	CSO
11	Industrial SMEs cooperating within their innovative operations in cluster initiatives or other formalised forms of cooperation	2010	14.05	16	20	CSO
12	Expenditure on information and communication technologies as %GDP	2009	6.3	8.5	9.0	Eurostat/EITO
Objective 3: *Increased resource and raw materials efficiency*						
13	Final energy consumption (kgoe/EUR, in fixed prices in 2000)	2010	0.24	0.2	0.2	CSO
Objective 4: *Increased internationalisation of the Polish economy*						
14	Exports of high technology products as a share of total exports	2009	5.7	6.5	8.0	CSO/NiT
15	FDI inflow in EUR million	2011	13 646	>10 000	> 10 000	National Bank of Poland (NBP).

Definitions of indicators:

1. Sum of internal expenditure incurred in a given year on R&D activities by all units involved in such operation in a given country, regardless of the source of measures, namely including measures received from abroad (R&D work export), does not cover measures involved in R&D work done abroad (R&D work import).
2. Classification of Poland in a given group.
3. Position of Poland in the ranking.
4. Relation between gross domestic product (GDP) and domestic material consumption (DMC), expressed in EUR/kg. The increase of the indicator over time suggests the increase in the efficiency of resources use in economic processes. DMC is a sum of all materials directly used in economic processes for the purposes of national economy. DMC includes the used national acquisition and import (the total weight of imported goods) minus export, expressed in physical units (the total weight of exported goods).
5. Expenditure on R&D activities in government sector (GOVERD) and higher education sector (HERD).
6. Expenditure on R&D activities in enterprises sector (BERD) as %GDP.
7. Early-stage venture capital including the so called seed capital and start-up capital as %GDP.
8. The value of reduced costs incurred by enterprises in order to be compliant with the regulations as a result of deregulation work as %GDP.
9. Product and process innovation should be understood as innovation defined in the publication 'Nauka i Technika 2009' in accordance with Oslo guidebook.
10. The share of high and medium-high technology products – based on the OECD list according to Standard International Trade Classification (SITC Rev. 4); the list accepted by Eurostat in April 2009 – for production sold in the industry.
11. Cluster initiative should be understood as cooperative links established formally on the basis of a letter of intent, association agreement or consortium agreement, etc.
12. Expenditure on IT (hardware, software) and telecommunication technologies (ICT networks, telephone equipment, radio, television and signalling equipment) in GDP percentage.
13. Relation between final energy consumption in kilograms of oil equivalent (kgoe) and GDP (calculated per EUR 1). The final consumption is measured according to the methodology applied in Odyssee base.
14. The share of high and medium-high technology products – based on the OECD list according to Standard International Trade Classification (SITC Rev. 4); the list accepted by Eurostat in April 2009 – for production sold in the industry.
15. Annual inflow of foreign direct investments (FDI) expressed in EUR million.

Financing

Determining innovation policy should be accompanied by revising its financial instruments. Effective innovation policy requires above all functional market mechanisms, but at the same time direct public intervention cannot be abandoned. Nevertheless, it is most important to specify the relevant proportions[93] that take into account various extent – for various types of knowledge – in which given knowledge has (or should have) a nature of a public good (and requires direct intervention) or of a private good (and requires mainly functional markets). The first area regards mainly actions and research programmes related to 'radical' and social innovations. On the other hand, market mechanisms and stimulating private capital should contribute to e.g. incremental innovations. They should also prevail in the adaptation and implementation phases, however, in this area public intervention, covering e.g. early stage of technological development, is conceivable. The actions taken will result in the increase of effectiveness of public R&D expenditure, innovation adaptation and implementation as well as the increase of the volume of private expenditure on innovative activity.

Implementation of the Strategy objectives will be financed from:
- national public funds in a specified scope, i.e. national budget funds and national dedicated funds, local authority budget funds as well as other funds from authorities and legal and organisational entities of the government finance sector,
- EU public funds as well as funds from other foreign sources,
- private funds including as well credits and loans, also the ones guaranteed or warranted by entities authorised to grant guarantees or warranties.

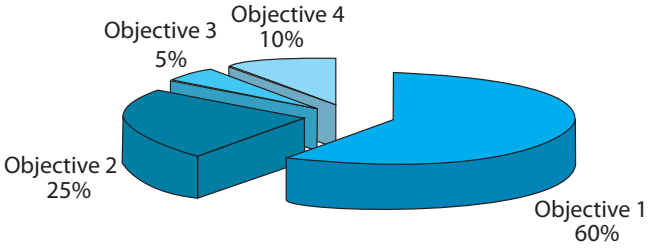
The total budget of the Strategy financed from the public funds for 2012–2020 was specified in the medium-term National Development Strategy 2020 which set the financial framework for each of the integrated development strategies. According to the NDS 2020 volume of the public funds allocated by the Strategy… to development goals (in line with COFOG) oscillates around **97.3 billion PLN**[94].

[93] Both too low and too high level of public support discourages the private sector from financing innovations.

[94] *National Development Strategy 2020. Active society, competitive economy, efficient state* – attachment to Resolution No 157 of the Council of Ministers of 25 September 2012, p. 141.

Assumptions presented in the document indicate certain direction, while the amounts and sources of financing will be precisely specified in the implementation documents, especially in the Enterprise Development Programme. Implementation of measures specified in the Strategy will depend on the financial capacities of the national budget.

*Chart 2. Budget structure of the Strategy by specific objectives**



** estimated percentage share of funds allocated to implementation of a specific objective in the total Strategy budget value*

Specifying sources and volume of expenditure on implementation of the Strategy in the whole implementation period (until 2020) bears a significant level of uncertainty. The difficulties concern mostly the value of the amounts allocated to implementation after 2013.

EU funds will still be the main source of financing expenditure for Strategy implementation, at least until 2013. For the period 2007–2013 Poland has received an allocation of 67.3 billion EUR, which makes our country the major beneficiary of the EU cohesion policy. In the current financial perspective the Strategy objectives are implemented mainly under the Operational Programme Innovative Economy, which engaged in total 10.18 billion EUR from the public funds[95] (including 8.65 billion EUR of the ERDF contribution). Partly, the Strategy objectives will be implemented under Operational Programme Infrastructure and Environment, Operational Programme Human Capital, Operational Programme Development of Eastern Poland (OP DEP), Regional Operational Programmes.

Until 2013 an important source of implementing the Strategy objectives related to supporting technological development and R&D will still be the Seventh

[95] OP-IE allocation increased (from ca. 9.7 billion EUR) as a result of division of funds from the National Performance Reserve and the technical adjustment.

framework programme for research and technological development (7FP). The programme budget amounts to 57 billion EUR. It is thus the major instrument of financing and shaping scientific research at a European level.

Other community budget funds contributing to implementation of the Strategy objectives under the current financial perspective include Competitiveness and Innovation Framework Programme 2007–2013 (CIP) or community initiatives focused on improving access to financing, especially JASMINE and JESSICA[96].

The future cohesion policy will reflect strongly the EU priorities defined in the Europe 2020 strategy, which include but are not limited to development of knowledge- and innovation-based, competitive and more environment friendly economy. At the same time it constitutes the Member States' political commitment to achieve measurable objectives, therefore it will directly correlate with national socio-economic policy. Poland's commitment to increase R&D expenditures to 1.7% of GDP by 2020 is especially important from the point of view of the Strategy objectives and ensuring necessary financing.

In case of the national public funds, the situation is complicated by the structural deficit in the public finances which overlaps with the effects of the global financial crisis. This condition explicitly limits the freedom of shaping fiscal policy, which in the short term significantly hinders improvement of the pro-development expenditure to fixed (legally determined) expenditure ratio. However, in practice these limitation should not affect co-financing of the programmes implemented under cohesion policy in any way.

In order to achieve the main objective of the Strategy, focusing public expenditure on the pro-development actions will be crucial. Long-tem and stable economic growth to be provided by i.a. balancing public finances, limiting the rate of the national debt increase or pro-development allocation in the public expendi-

[96] JASMINE (*Joint Action to Support Micro-finance institutions in Europe*) – joint undertaking of the Commission, EIB and EIF to support microcredit institutions in Europe. It includes technical assistance to microcredit providers in order to help them become reliable financial intermediaries and facilitate access to capital.
JESSICA (*Joint European Support for Sustainable Investment In City Areas*) – joint undertaking of the Commission, EIB and Council of Europe Development Bank (CEB) to support investments contributing to sustainable development of urban areas. JESSICA initiative is a financial engineering instrument that assumes the usage of some of the European structural funds by the way of returnable investments (loans, guarantee, capital contribution) in projects concerning sustainable development of urban areas.

ture is considered as a springboard for development by the Long-Term National Development Strategy. These actions, especially taking directional decisions in the perspective until 2015 that affect long-term stability of public finances, create real space for increasing the share of pro-development expenditure.

However, it should be noted that interventions under the Strategy bring specific financial effects to the national budget. It results from the necessity to gradually increase expenditure on research and higher education in the coming years. The amount of the additional expenditure increases, taking into consideration also the requirement of providing national contribution for financing projects, that will be submitted after 2010 and in the next financing period, to the EU structural funds (assuming that a significant part of the EU funds, comparable to the previous funds, will be allocated to financing innovation and scientific research).

Within the perspective of the Strategy, the National Science Centre and the National Centre for Research and Development are going to become important entities in the field of financing research and development. Establishing NSC and NCRD, which have significant autonomy in determining its action policy, intends to exclude financing research from the competence of the government and transferring them to independent institutions. The current organisational system provides that NCRD will finance projects in the research areas of strategic importance for the country's development and applicable in the economy, while NSC – fundamental projects. Main tasks of NSC are management and financing of the fundamental projects (bottom-up approach) as well as financing specialist equipment necessary for project implementation, which compliments basic research infrastructure of the scientific entities. As regards NCRD on the other hand, the portfolio of its "other tasks" was expanded with stimulating enterprise investment in R&D and supporting scientific entities in obtaining off-budgetary resources for science and R&D activity, supporting development of academic staff, initiating and implementing programmes covering scientific research and development as well as preparatory measures for implementing these research results, initiating and implementing programmes covering financing applied research. In 2012 NSC's budget (revenue) amounts to ca. 0.9 billion PLN and NCRD's to ca. 1.5 billion PLN. For 2013 the budget of these institutions is planned to amount to 899.5 billion PLN and 1 704 billion PLN respectively[97].

[97] Based on the draft Budget Law for 2013 adopted by the Council of Ministers on 27 September 2012, annex no. 12. The draft was adopted together with supplementary material 'Planning in the performance system for 2013'.

Single measures will be financed from the Polish Science and Technology Fund. The amount of the funds allocated from this source to supporting scientific research and expanding research infrastructure of Polish science is estimated to 200 billion PLN in 2012 and 100 billion PLN in the next two years. Measures aiming at scientific research as well as dissemination, promotion and popularisation of science will be of interest to many institutions, which is also confirmed by their financial planning (their expenditure is adjusted to the scale of activities). They include i.a. the Polish Institute of International Affairs, which in the period specified will spend 1 million PLN per year to this end. Measures aiming at development of science in specific fields are also funded among others by Ministers of Justice or National Defence. Measures dedicated to the tourism sector intended to support and promote it will be funded largely by the Ministry of Sport and Tourism and the Polish Tourist Organisation (Polska Organizacja Turystyczna). Implementation of the Strategy will also involve i.a. funding from budgets of Ministers of Environment, Foreign Affairs, Justice, Treasury, Infrastructure or Culture and National Heritage – as regards measures in the areas within the competence of a given Minister (e.g. economic courts, ownership changes) or supporting initiatives which contribute to achievement of the main objective of the Strategy (i.a. creative industries, sustainable building, efficient use of resources)

Setting a financial framework of the Strategy is consistent with projection presented in the Multiannual State Financial Plan for 2012–2015 (for the indicated time period). *Strategy for Innovation and Efficiency of the Economy prevails in the strategic area of Innovation* where 4 development priorities were identified, i.e.: 1) Improving macroeconomic conditions, 2) Stimulating entrepreneurship development and job creation, 3) Stimulating innovation in the economy, 4) Strengthening competitiveness of Polish economy and science on an international scale, and 2 development functions were assigned, i.e. function 6. State economic policy and function 10. Polish science.

Measures related to expenditure on research results commercialisation, stimulating cooperation between science and economy will be financed to a large extent from the off-budgetary resources. The demand for research projects among the investment funds and the value of resources owned by these funds are already higher than the expected value of the research projects suitable for commercialisation by the investment funds and other financial mechanisms.

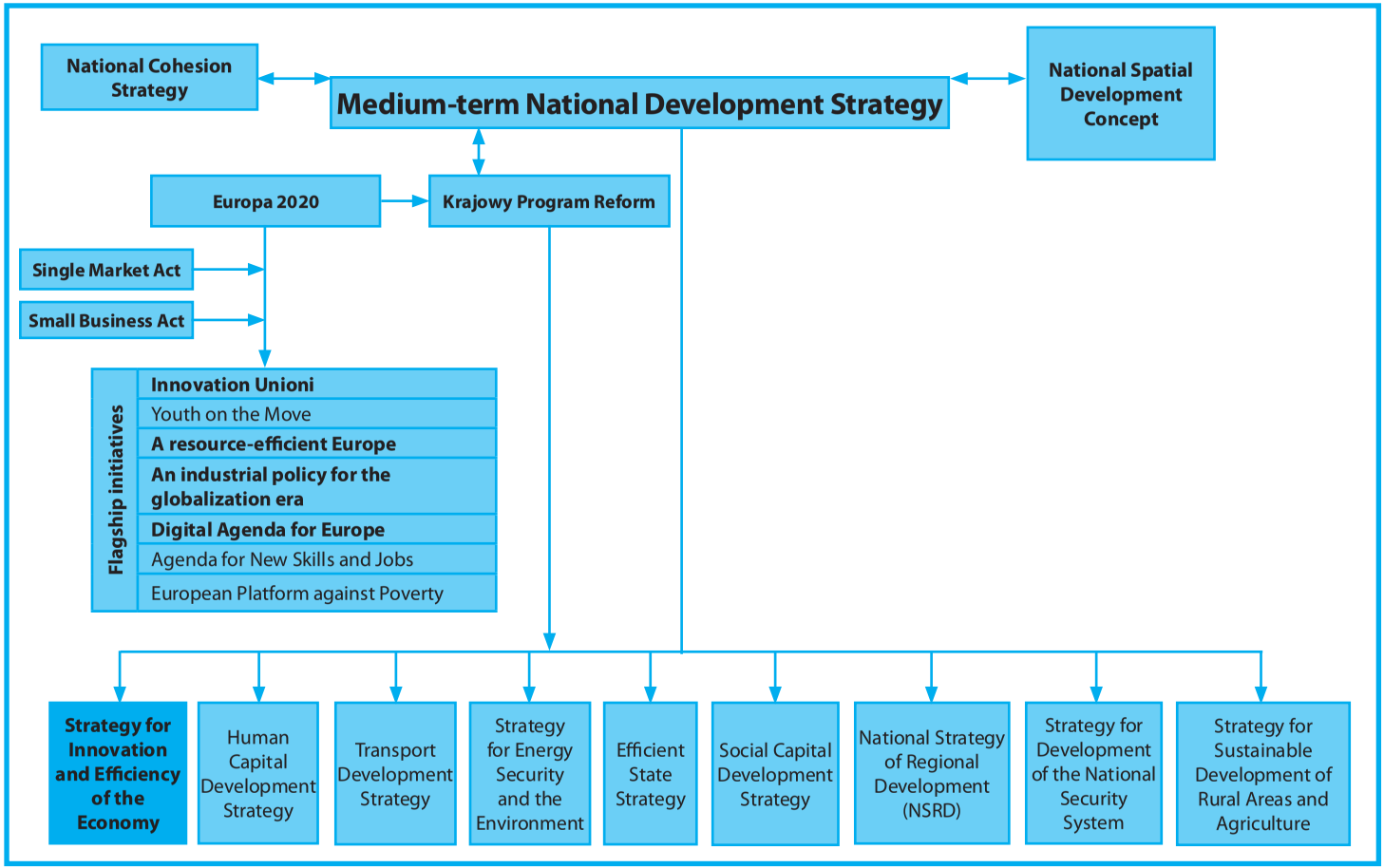
In general, the increasing R&D expenditures result not only from a higher budget for this objective, but also from growing importance of this matter in the government economic policy. They will also result from the expected paradigm shift in the cohesion policy, which enables increasing investment in the area of R&D as well as growth of importance of R&D as source of competitive advantage to the enterprises. The resultant pressures on the national budget will grow at a comparable pace, which will be related to the change of R&D expenditures funding structure in the time period of the Strategy. The government policy that encourages to increase private expenditures on R&D should lead to it gaining 35% share in the total expenditure in 2014 and 50% in 2020. The sources of improvement of the indicators, but also of the measurable changes in our economy, should be seen in the private investment projects in the ICT and modern technologies sectors, in line with the principle of higher economic productivity in the environment of open exchange of knowledge, open innovation.

Table Forecasts of national research and development expenditure in the 2011–2020 period (% of GDP)[98]

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
% share	0.75	0.80	0.83	0.86	0.93	1.07	1.21	1.33	1.57	1.70

Source: MSHE

[98] National Reform Programme for the implementation of the Europe 2020 Strategy. Update 2012/2013 – adopted by the Council of Ministers on 25 April 2012, p. 11.


National Cohesion Strategy
Medium-term National Development Strategy
National Spatial Development Concept
Europa 2020
Krajowy Program Reform
Single Market Act
Small Business Act
Flagship initiatives
Innovation Unioni
Youth on the Move
A resource-efficient Europe
An industrial policy for the globalization era
Digital Agenda for Europe
Agenda for New Skills and Jobs
European Platform against Poverty
Strategy for Innovation and Efficiency of the Economy
Human Capital Development Strategy
Transport Development Strategy
Strategy for Energy Security and the Environment
Efficient State Strategy
Social Capital Development Strategy
National Strategy of Regional Development (NSRD)
Strategy for Development of the National Security System
Strategy for Sustainable Development of Rural Areas and Agriculture

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List of abbreviations

Abbreviation	Full term
ARMA (ARiMR)	Agency for Restructuring and Modernisation of Agriculture (Agencja Restrukturyzacji I Modernizacji Rolnictwa)
BEI (IOB)	Business environment institutions (Instytucje Otoczenia Biznesu)
BGK	Bank Gospodarstwa Krajowego
BPO	Business Process OutsourcingObsługa procesów biznesowych)
BRIC	Brazil, Russia, India, and China
COIE	Investor and Exporter Service Centre (Centrum Obsługi Inwestorów i Eksporterów)
CPI	Consumer Price Index
CPM (KPRM)	Chancellery of the Prime Minister (Kancelaria Prezesa Rady Ministrów)
CSO (GUS)	Central Statistical Office (Główny Urząd Statystyczny)
EC (KE)	European Commission (Komisja Europejska)
ECIC (KUKE)	Export Credit Insurance Corporation (Korporacja Ubezpieczeń Kredytów Eksportowych)
EIS	European Innovation Scoreboard
EMAS	Eco-Management and Audit Scheme System ekozarządzania i audytu)
EPO (EUP)	European Patent Office (Europejski Urząd Patentowy)
ESS (SSP)	Efficient State Strategy (Strategia Sprawne Państwo)
ETS	Emissions Trading System (Europejski system handlu emisjami)
EU (UE)	European Union (Unia Europejska)
FPS (FNP)	Foundation for Polish Science (Fundacja na rzecz Nauki Polskiej)
GLC (RCL)	Government Legislation Centre (Rządowe Centrum Legislacji)
HCDS (SRKL)	Human Capital Development Strategy (Strategia Rozwoju Kapitału Ludzkiego)
ICT	Information and communication technologies (technologie informacyjne i komunikacyjne)
IUS	Innovation Union Scoreboard
local authority units (JST)	Local authority bodies (Jednostki Samorządu Terytorialnego)
KPO	Knowledge Process Outsourcing

Abbreviation	Full term
KSFP	National Association of Guarantee Funds (Krajowe Stowarzyszenie Funduszy Poręczeniowych)
MAD (MAiC)	Ministry of Administration and Digitization (Ministerstwo Administracji i Cyfryzacji)
MARD (MRiRW)	Ministry of Agriculture and Rural Development (Ministerstwo Rolnictwa i Rozwoju Wsi)
MCNH (MKiDN)	Ministry of Culture and National Heritage (Ministerstwo Kultury i Dziedzictwa Narodowego)
MoE (MG)	Ministry of Economy (Ministerstwo Gospodarki)
MEnv (MOŚ)	Ministry of the Environment (Ministerstwo Środowiska)
MF	Ministry of Finance (Ministerstwo Finansów)
MFA (MSZ)	Ministry of Foreign Affairs (Ministerstwo Spraw Zagranicznych)
MJ (MS)	Ministry of Justice (Ministerstwo Sprawiedliwości)
MLSP (MPiPS)	Ministry of Labour and Social Policy (Ministerstwo Pracy i Polityki Społecznej)
MNE (MEN)	Ministry of National Education (Ministerstwo Edukacji Narodowej)
MRD (MRR)	Ministry of Regional Development (Ministerstwo Rozwoju Regionalnego)
MSHE (MNiSW)	Ministry of Science and Higher Education (Ministerstwo Nauki i Szkolnictwa Wyższego)
MST (MSiT)	Ministry of Sport and Tourism (Ministerstwo Sportu i Turystyki)
MT (MSP)	Ministry of Treasury (Ministerstwo Skarbu Państwa)
MTCME (MTBiGM)	Ministry of Transport, Construction and Maritime Economy (Ministestwo Transportu, Budownictwa i Gospodarki Morskiej
NCRD (NCBiR)	National Centre for Research and Development (Narodowe Centrum Badań i Rozwoju)
NFEPWW (NFOSiGW)	National Fund for Environmental Protection and Water Management (Narodowy Fundusz Ochrony Srodowiska I Gospodarki Wodnej)
NSC (NCN)	National Science Centre (Narodowe Centrum Nauki)
NSRD (KSRR)	National Strategy of Regional Development 2010–2020: Regions, Cities, Rural Areas (Krajowa strategia rozwoju regionalnego 2010–2020: regiony, miasta, obszary wiejskie)
NSS (SRSBN)	Strategy for Development of the National Security System (Strategia rozwoju systemu bezpieczeństwa narodowego RP)
PAED (PARP)	Polish Agency for Enterprise Development (Polska Agencja Rozwoju Przedsiębiorczości)

Abbreviation	Full term
PBICA (SOOIPP)	Polish Business and Innovation Centres Association (Stowarzyszenie Organizatorów Ośrodków Innowacji i Przedsiębiorczości w Polsce)
PFSA (KNF)	Polish Financial Supervision Authority Office (Urząd Komisji Nadzoru Finansowego)
PIFID (PAIiIZ)	Polish Information and Foreign Investment Agency (Polska Agencja Informacji i Inwestycji Zagranicznych)
PolPO (UPRP)	Polish Patent Office (Urząd Patentowy Rzeczypospolitej Polskiej)
PubPO (UZP)	Public Procurement Office (Urząd Zamówień Publicznych)
PPP	public-private partnership
PSFP	Polish Association of Loan Funds (Polskie Stowarzyszenie Funduszy Pożyczkowych)
R&D (B+R)	Research and development (badania i rozwój)Badania i rozwój)
RDI (B+R+I)	Research, development and innovation (badania, rozwój i innowacje) Badania, rozwój i innowacje)
RES (OZE)	Renewable energy sources (Odnawialne Źródła Energii)
SCC	Shared Service Centre
SCDS (SRKS)	Social Capital Development Strategy (Strategia Rozwoju Kapitału Społecznego)
SSDRAAF (SZRWRR)	Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries (Strategia Zrównoważonego Rozwoju Wsi, Rolnictwa i Rybactwa)
SESE (BEiŚ)	Strategy for Energy Security and the Environment (Strategia Bezpieczeństwo Energetyczne i Środowisko)
SIEE (SIEG)	Strategy for Innovation and Efficiency of the Economy (Strategia Innowacyjności i Efektywności Gospodarki „Dynamiczna Polska 2020")
SII	Summary Innovation Index
SME (MŚP)	Small and medium-sized enterprises
TDS (SRT)	Transport Development Strategy (Strategia Rozwoju Transportu)
UKE	Office of Electronic Communications (Urząd Komunikacji Elektronicznej)
WSE (GPW)	Warsaw Stock Exchange
ZBP	Polish Bank Association (Związek Banków Polskich)
VEB (ZW)	Voivodeship executive board (Zarząd Województwa)

Annex

– Information on results of a public consultation carried out by SIEE

Public consultation was held from 23 February to 30 March 2011. Apart from a formal call for expression of comments, the information on consultation was published in the Rzeczpospolita journal of 3 March 2011. Within the framework of the consultation a meeting with social partners took place at the Ministry of Economy headquarters. In total ca. 30 entities participated in the consultation. Comments were submitted i.a. by marshal's offices (11 replies), city offices (2), employers' organisations (3), all-Polish trade unions (1), professional chambers (1) and scientific institutions, associations. There was one case of a comment from an individual.

As expected, most similarities in the submitted comments were in the replies from the marshal's offices. They pointed out mainly that the project is not fully compliant with the Act of 6 December 2006 on the Principles of Development Policy Making. Most often they emphasised the insufficient consideration of development trends, territorial dimension (including interventions on a voivodeship or at least territorial scale) and information on the financial resources allocated to the Strategy implementation. In the context of the trends (and development scenarios) they called among other things for applying results of the Poland 2020 Foresight and Foresight of personnel in modern economy. As regards territorial dimension, they emphasised that the Strategy does not provide dedicated measures aiming at but not limited to using territorially diversified development potentials or actively combating marginalisation of the least developed regions and limiting development disproportions between the voivodeships.

Some authors of comments found the lack of clearly defined delineation of tasks in the Strategy implementation system. In this context the necessity of taking into account the role of the Ministry of Economy, Ministry of Science and Higher Education, Ministry of Finance and voivodeship authorities was highlighted. Including the regions into the system of implementing the Strategy (implementing, monitoring and evaluating) was explicitly called for.

Another comment submitted by the regions concerned the excessively elaborate structure of the document (delineation of the main objective, operational objectives, priority areas and directions of interventions, respectively). They

also mentioned that coordination mechanisms for the Strategy implementation should be defined. This comment entailed as well as demand to clarify the implementation system.

The comments on the project signalled that the scope of the project in question overlaps with the scopes of other integrated strategies. They suggested that it is necessary to maintain better complementarity (resigning from discussing some of the areas, e.g. transport, especially in the part on the planned intervention) or explicitly specify the leading strategy in a given area. On the other hand, the document was accused of lacking coherence with other integrated strategies.

Some of the comments regarded the overly extensive size of the Strategy. Certain institutions considered it as an issue that prevents further substantive evaluation of the project provisions. The problem of the document structure was also pointed out – in certain areas the project stipulated far-reaching simplifications, while in others its provisions were very detailed and adjusted to the relevant information context. Moreover, the document was accused of being unclear, which hinders its reception. The respondents pointed out that it is necessary to organize the content, detail the most essential issues while preserving the logical links and coherence of the document. In this respect, they stipulated that the Strategy focuses mainly on innovation. .

The authors of comments indicated that the subject matter of the Strategy is too broad. They pointed out that in order to achieve the objectives set it is necessary to focus the financial and organisational resources on particular themes, entities or even territories.

As opposed to the recommendation to simplify and prioritize the Strategy, it was suggested to elaborate certain issues, e.g. sectoral analysis regarding innovation. The question of cooperation between enterprises and R&D sector was particularly highlighted.

The comments indicated that the Strategy enumerated the measures assumed within the framework of intervention directions, which lead to the objectives set. According to the authors of the comments there is a risk that it would be impossible to complement them with undertakings not included in the study. Such attitude prevents an adaptive reaction to changes in the social and economic environment.

The social partners pointed to the question of validity of the data, their completeness and adequacy to the project needs, e.g. regarding the reports and analytical publications that present Poland's position in various rankings related to competitiveness, ease of running a business or innovation. Is was suggested to limit the unnecessary data that do not add value to the study.

The comments regarded also the structure of the SWOT analysis. Most of the comments pointed to the incorrect classification of the specific factors to relevant categories (e.g. confusing strengths with opportunities and weaknesses with threats). It was also suggested to dispense with certain elements analysed in the SWOT table.

As regards the Diagnosis, changes aiming at clarification of its provisions were suggested. The comments regarded among other things supplementing this part of the study with information on: enterprise membership and participation in unions, organisations, associations – these kinds of forms are of fundamental importance in terms of an indirect impact on the economy; role of climate change and demographic change as factors directly affecting the economy that were not properly included in the project; question of roles played by the microenterprises and their impact on the economy.

It was suggested to broaden the description of each Priority Area or in the contrary – to condense the overly elaborate descriptions of the objectives.

The Strategy implementation monitoring indicators were also addressed. Some comments suggested increasing the number of indicators, e.g. regarding the efficiency of the science sector.

Lack of a definition of a very important factor, that is innovation culture, was pointed out. It was emphasised that the innovation strategy should cover the whole society. It is necessary to make the institutions, enterprises, universities, social organisations and citizens aware that they have to participate in implementing the Strategy. The value of joint actions was also noted (innovations may occur in any place and area of life as an answer to practical needs). It was doubted that the excessively high level of public support for innovation discourages the private sector to finance R&D. It was indicated that the suggestion to increase public expenditures on R&D and innovation should be related to making the national innovation policy more market-oriented. It was suggested to

introduce systemic mechanisms and solutions in the field of science and R&D. It was also pointed out that the private sector plays the leading role in financing R&D, as in highly developed countries. Some of the comments suggested that too little emphasis was put on the transfer of knowledge between enterprises and that the issue of commercialisation and implementation of research results was insufficiently covered.

Certain comments indicated the need of introducing a coherent and uniform monitoring system based on Regional Innovation Strategies implemented regionally. Such structure should allow to obtain organized and cyclical data that would provide reliable picture of Polish innovation. The comments indicated that the document did not define the way of measuring the effects of the Strategy implementation and did not specify the institution responsible for monitoring. It was concluded that the presented 'Reporting and monitoring system' is limited only to showing a catalogue of indicators, often without specifying the baseline values or targets. It was also noted that only 25 of 65 indicators presented would be monitored on an obligatory basis. The comments on the indicators pointed also to another direction: the necessity to focus on the key indicators.

Among the positive comments it was pointed i.a. to the increase of the role of general technologies, emphasised in the project, that increases competitiveness of many sectors. The provisions regarding the necessity to increase and expand the role of universities, which should adjust their offer to the current market needs, were also welcomed positively.

Moreover, it was underlined that the Strategy directly addresses the phenomenon of cluster-based economic development. Way of addressing this issue is in line with the perspective of the Commission, which emphasises the innovative solutions that should result from cooperation in clusters.

Certain comments also welcomed positively the way of defining the vision, strategic objective and horizontal principles in the Strategy. It was underlined that the vision presented in the document reflects well on the diagnosed problems and the strategy implementation should be based on strengths and opportunities. It was pointed out that the planned intervention should result in limiting the weaknesses of the Polish economy and the threats it faces. Moreover, it was repeatedly underlined that the Strategy in technical terms is a good document of strategic nature. Its structure was recognized – i.e. differentiation of the diag-

nostic and prognostic parts together with a good definition and description of particular interventions and areas of action. Some of the comments included high evaluation of the situation diagnosis, including the current state of innovation.

In the context of the whole process of preparing strategic documents, there were opinions regarding lack of correlation between the timetables of the Long-Term and Medium-Term National Development Strategies and other integrated strategies. The comments regarded mainly the potential risk of lack of coherence between the integrated strategies and the high level strategies.


SIEE
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