

CluStrat – Boosting Innovation through new Cluster Concepts in support of emerging Issues and cross-sectoral Themes

Report on the national potential of Hungary

EMERGING INDUSTRIES

- Active Aging
- Sustainable Development / Green Economy
- Sustainable / Intelligent Mobility

CROSS-CUTTING ISSUES

- Internationalization
- Technology & Knowledge Transfer
- Gender in Innovation, including diversity aspects

Date:	<i>14/08/2013</i>
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This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF.

1 Introduction

Hungary is situated in the centre of Europe in what is known as the Carpathian basin. The total surface areas covered by Hungary is 93,036 km² (1% of the area of Europe) making it one of the smallest country in Europe. Hungary has land borders with seven other European countries and it is one of the few countries in Europe with a geography that is completely landlocked, meaning it has no coast. The population of Hungary (currently 9.91 million) has been diminishing ever since the early 1980s. Between 1980 and 2013 January its number decreased by nearly 800,000 persons; The reduction is the joint consequence of the low number of births and the high number of deaths (9.1 births and 13.0 deaths/1,000 population (2012)). As women live nine years longer than men on average, their share within the population is growing. The steadily growing number of elderly people is one of the most highlighted demographical factor, the age structure of the society is influenced also by the number of births largely fluctuating in the past decades. Over one fifth of the present Hungarian population has already turned 60 and every sixth citizen is more than 65.

The main sectors of Hungarian industry are heavy industry (mining, metallurgy, machine and steel production), mechanical engineering, chemicals (especially pharmaceuticals and plastics production), food industry (focused on processed foods) and automotive. Advanced technologies account for approximately one-quarter (22%) of Hungarian export - in this category Hungary occupies a leading position in Europe. Over 15 years (starting from 1995) Hungary increased tenfold the share of its global participation in high-tech. At that time, there has been a shift from exporting low technology (such as wood and textiles) to medium and high technology (including rubber products, motor vehicles, optical equipment). Hungary is currently the largest manufacturer of electronics in Central and Eastern Europe, and the main fields in this industry are: the technology of mobile communication, medical equipment, automotive electronics and nanoelectronics.

In line with global economic trends the growth of the Hungarian economy lost impetus in 2011. The GDP per capita in Hungary was \$20 310 in this year (PPP) and the Gross Domestic Product (GDP) was \$198.8 billion (PPP) in 2012. Hungary GDP Growth Rate averaged 0.51 percent from 1996 until 2013, reaching an all-time high of 2.17 percent in March of 2002 and a record low of -3.40 percent in March of 2009. The tendency of growing is indicated by the GDP which expanded 0.70 percent in the first quarter of 2013 over the previous quarter. Hungarian economy is a medium-sized, structurally, politically, and institutionally open economy in Central Europe and is part of the EU single market. Hungary is a rapidly developing country and the fifth largest national economy in Central and Eastern Europe.

The number of economic organizations was 1 806 062 at the end of 2012. The distribution of the category is the following: 600 759 companies and partnerships; 1 065 643 entrepreneurs; 139 660

governmental, nonprofit and other organizations. There are huge differences in the regional distribution of businesses; more than half of the companies and partnerships were registered in Central Hungary, other regions accounted for 6.3 to 8.4%. Concerning entrepreneurs, there was a much more balanced distribution; the share of 22.2% of Central Hungary was followed by 9.5 to 19.5% in other regions.

Hungary is one of the moderate innovators with an average performance. Relative strengths are in outputs; Relative weaknesses are open, excellent and attractive research systems, finance and support, firm investments, linkages & entrepreneurship, intellectual assets and innovators. In 2011 research and development activities in Hungary increased further, quicker than in the previous year. R&D expenditures rose by 8.5%, thus they exceeded HUF 336 billion, which reached 1.2% of GDP compared with 1.16% last year. The number of research units remained essentially unchanged, only an increase of 0.6% could be observed. R&D personnel grew by 2.6%, so nearly 37 thousand researchers and close to 18,500 technicians and other personnel participated in R&D activities. Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. The number of national patent applications was 698 in 2011 which level is similar to the year of 2010. R&D covers basic research, applied research, and experimental development.

The cluster development model in Hungary determines three significant categories of clusters. These categories are as follows: Start-up initiatives, Developing clusters, Accredited Innovation clusters (AIC). Altogether nearly 200 clusters have already been registered in the framework of the above categories in Hungary and 23 of those ones have acquired the Accreditation Certificate so far. The industrial branch distribution of existing clusters in AIC category is as follows: 8 ICT, 5 Healthcare industry, 2 Environmental industry, 2 Packaging and plastics industry, 2 Construction & Energetics, 2 Machinery and vehicle production, 1 Food industry and 1 Wood and furniture industry.

2 Emerging Industries

From the point of view of the major indicators of aging the picture is rather homogeneous in Hungary - the populations of cities, towns, and villages in Hungary are fundamentally ageing and decreasing. There are two documents in Hungary that deal with the phenomenon of an ageing society on national level - one in a long term and the other in a short term:

- ‘The National Strategy for the Elderly’ was passed by the Parliament in 2009 (81/2009. (X.6. Parliament Resolution)
- ‘The Hungarian Program for the European Year for Active Ageing and Solidarity between Generations in Hungary’ was prepared for the Active Ageing Initiation of Europe 2012 (1089/2012. (IV. 2.) Parliament Resolution)

Based on findings of above documents, the reallocation of national resources between generations is necessary because the phase of production and the phase of consumption do not overlap. The inactive age groups are also consuming, but production is only performed by the working age groups; That’s why the supporting and facilitation of *active old-age* are the generally accepted means for managing the presented social phenomena in Hungary.

The document of ‘Hungary's National Framework Strategy on *Sustainable Development* (henceforth: Framework Strategy) for the period of 2012–2024’ was adopted by the Parliament in March 2013 based on the Resolution 18/2013. (28th March). The Parliament mandated the Government to establish a body of state secretaries, responsible for the coordination of governmental decisions effecting sustainable development, facilitating the realization and enforcement of the Framework Strategy. Both of unfavourable processes, strategic goals and intended measures are related to four categories of our national resources as follows: Human resources; Social resources; Natural resources; Economic resources. It is worth noting that the Hungarian targets for 2020 on climate change and energy efficiency are as follows: increasing the share of renewable energy sources to 14.6%, the introduction of rationalization, reduction of energy consumption by 10% and increasing the greenhouse gas emissions by no more than 10% compared to their level in 2005.

The *Mobility Management* is a concept¹ to promote sustainable transport and manage the demand for car use by changing travellers’ attitudes and behaviour. In Hungary, the mobility service providers have struggled with obsolete fleet and soft services for decades. In view of the restricted elbowroom, the government has aimed the improvement of various (local and interurban) services by the alignment of mobility management operation. At the core of mobility management are ‘soft’ interventions like information and communication activities, organizing services and coordinating activities of different partners; These measures generally enhance the effectiveness of ‘hard’ measures within urban

¹ The applied definition of mobility management is determined by the MAX-consortium and EPOMM.

transport (e.g., new tram lines, new roads and new bike lanes). The most mentionable ‘soft’ interventions has started under the framework of regional and national operational programmes (2007-13) in Hungary; mostly ICT improvements in order to enhance mobility service- and information systems can be mentioned in this category.

First of all, we would like to stress that all of the selected emerging industries play important role in the Hungarian development policy. In view of its timeless and wide-range focus on the overall development at national level *the national project team selected the category of ‘Sustainable Development/Green Economy’* as highlighted EI in the context of project CluStrat. The sustainable development is a priority among the objectives of the EU and Hungary as well; Its aim, which is determined by a national framework strategy, is to improve the life quality and welfare of the present and the future generations by linking economic development, environmental protection and social justice. As it has been presented in previous project-reports, the Sustainable Development/Green Economy (SD/GE) would be enhanced as separated emerging industry, but should be applied in the context of propulsive traditional industries (e.g. automotive or mechatronics) in Hungary.

The *strengths* in terms of the SD/GE in national context are as follows:

- Existing National Framework Strategy on Sustainable Development of Hungary passed by the resolution of the Parliament
- Instituted development policy measures initiated by the government
- Existing, integrated and national level approach of the development of human, social, natural and economic resources
- Possibility of the linkage to propulsive traditional industries at national/regional level
- Transnational experiences and practice-oriented solutions at medium enterprises and big companies
- Relatively strong capacities in RDI sector
- Initial cooperation relationships in the activities related to GE

Gaps in terms of the application of SD/GE-oriented strategy/measures:

- Responsibility has not been taken by all of the individual decision making entities (organisations, individuals - value problem)
- Relatively great number of small economical organisations with relative deficient in development funds
- The interests of sustainable developments aren’t balanced with the short term interests of development-owners at project level
- The lack of legal conditions in the area of renewable energy

In the field of *human resources/potential*, the positive Hungarian attitude in the field of getting knowledge can actively contribute to human factors of sustainability. The *social dimension* of resources/potential is strengthened by the increased significance of the work and property related income of the elderly. The individual responsibility to reduce environmental damage is able to result higher efficiency of measures based on existing *natural energy sources* (biomass, geothermal, hydro, solar and wind energy, agricultural by-products, as well as agro-fuels and biogas within energy use). Considering the *economic resources*, both large multi-national enterprises and small- and medium-sized domestic enterprises are present in the economy of Hungary. To reinforce the latter and enhance their competitiveness on both the domestic and the external market are important objectives; That's why the application of new, effective and efficient solutions (productive sources and technologies, management instruments, etc.) for sustainable development is one of their basic interests. The *most highlighted potential* is the real economical possibility and demand of developments on the basis of the SD/GE industry application in traditional propulsive industries (*automotive, engineering, heavy industry, mechatronics, chemicals, food industry*) in Hungary.

The *overall objective* of the national sustainability policy is to ensure the conditions of adaptability to the ever evolving social-human-economic-natural external environment and the quality improvement of the cultural adaptation required. Based on the project-frames determined by the Partnership, we have to concentrate on practice-oriented objectives and elements of a *development strategy focused on the application of SD/GE in network-oriented economic structure in propulsive industries in Hungary*. The schematic overview of these *strategic objectives and possible development measures in the context of national resources* can be summarized as follows:

- *Human resources* - the objective is a labour force possessing knowledge and skills required to tackle the challenges of current times. Development measures:
 - Supporting lifelong learning through employee trainings; Increasing the efficiency of knowledge-producing institutions for the transfer of work related knowledge, skills and competences; Improving the quality of trainings
 - Supporting RDI activities conducted by universities, research institutions and their collaborations – Supporting civil-business-scientific cooperation
 - Reduction of work related stress and adjustment of working conditions – appropriate establishment of work and organisational culture
 - Employment of the members of disadvantaged groups, non-discrimination
- *Social resources* - the objective is the creation of a culture supportive of sustainability and the enhancement of positive values, norms and attitudes. Development measures:
 - Actions for strengthening the law-abiding behaviour (trainings, on-the-spot events)

- Strengthening the trust between social and economic actors (matchmaking, knowledge sharing)
- *Natural resources* - environmental carrying capacity must be applied as a barrier of the economy. Development measures:
 - Supporting the reduction of environmental hazards
 - Switching over to environment-friendly technologies
 - Supporting the production and use of renewable energy sources
 - Blue economy – supporting applied RDI activities supporting ecological production and consumption systems
- *Economic (physical) resources* - it is essential to maintain the appropriate level of sovereignty in economic decisions, to establish a rational balance between the utilisation of localisation and international economic relations under the egis of sustainable development. Development measures:
 - Preference to local production systems, strengthening of economic relations and networking
 - Supporting long-term employment and production-oriented investments at business actors (SD/GE orientation)
 - Creation of a business environment favouring entrepreneurial activities (SD/GE-oriented development of entrepreneurial areas, industrial parks)
 - Enhancing local economic relations, local supply chains
 - Ensuring the production of knowledge, supporting research, development, innovation in the business sector

Relevant projects

Title	Network of female entrepreneurship ambassadors (CIP project)
Year	2011-
Author	MAG as consortium member
Description	The main objective of the project is to establish a Hungarian network to inspire women of all ages to become entrepreneurs and to set up their own business. The project consortia also encourages women, who already have their own businesses, to develop and strengthen their company to become more successful
Webpage	http://www.legyelvallalkozono.hu/content.php?cid=cont_4d94885bcd45f4.47680467

Title	Management of the applied R&D portfolio at PharmAgora Cluster
Year	2007-
Author	PharmAgora Cluster
Description	Due to the wide-ranged portfolio of the member companies the Cluster provides comprehensive services in the field of health and pharmaceutical industry. The management organisation can be at members' disposal from the idea of a new medicine, functional food or dietary supplement, through the pre-clinical instrumentation, organization and monitoring of the pre-clinical studies.
Webpage	http://www.pharmagoraklaszter.eu/activity_fields.php

Title	Regional networking cooperation of the R&D&I potential of the Ökopolisz with the SME, enterprise and nonprofit organisation members of the ÖKOPolis Cluster for the national and external market of their products in the green, eco-friendly and biotechnologies
Year	2009-11
Author	ÖKOPolis Cluster
Description	Strengthening and facilitating of the venture cooperation based on R&D and innovation, regional economic development focused on GE industries with high added value and export potential.
Webpage	http://okopoliszklaszter.hu/en/granted-projects/blog

3 Cross-cutting Issues

Internationalisation of clusters functioning is immensely important since they join together many actors for resulting really strong synergy effect at transnational level. In the view of Hungarian specialities, we can stress the phenomena of duality. In one hand, the most of clusters have export-oriented (mostly foreign-owned) members with international co-operation; On the other hand only few clusters have (mostly tender-based) official cooperation or at least informal connection with foreign clusters. At the same time, on the basis of personal interviews with cluster managers, we can mention some effective and efficient results. Clusters, which are mostly focused on propulsive industries of Hungary and have made the first steps on the way of internationalization, have got positive impressions on the on-going collaborations and their impacts and they consider project development activities within cluster organizations as successful and they are wide open to learning and adapting international experiences.

In the period between 2008 and 2010, the proportion of enterprises with technological innovations was 18.4%, down by 2.4 percentage points on 2006-2008 and by 1.7 percentage points compared with 2004-2006. It is originated from the dual composition of Hungarian corporate sector and resulted exclusively from a fall in the innovation activity of small enterprises. Concerning acquisition of external knowledge, the tendency was even stronger, 29.4 % of enterprises with 250 or more employees and only 17.9 % of business with 50 or fewer employees adopted external knowledge during their innovations. Thanks to these findings, the Hungarian Government has started development pillars for strengthening the level and dynamism of *Technology and Knowledge Transfer* under the framework of the 'New Széchenyi Plan (NSzP)'. As effective result of interventions, the number of technology and knowledge transfer centres is more than twenty today and the intermediary role of cluster management organisations is significant in transfer processes.

In parallel with the European *Gender Equality* survey, in Hungary in the field of innovation there are fewer women than men employed. The number of women within total number of researchers was 11,729 in 2011; It generally represents 31.7 percents of the category, the most auspicious situation can be found in the fields of medical (46.2%) and social (43.5%) sciences. There were employed 2,565 researcher woman at R&D institutes and other research units; it means 41.1 % of the total circle of researchers related to these units in 2011. The most significant deviation can be found at R&D units of business enterprises where the number of women within total number of researchers is 2,897; it represents only 21.2 percents.

Based on the priorities of the Hungarian development policy and in view of its competitive benefits regarding to business sector, the national project team has given the focus on *Knowledge And Technology Transfer (KTT)* development in the framework of project CluStrat. In order to appear with competitive products and services on the international and domestic markets, Hungary have to vitalize the economy focused on competitive sector and to development devices connecting to possible break-

out points. The presence of developed clusters is unequivocal in propulsive industries which are in highlighted position in the 'New Széchenyi Development Plan'. In order to realize the intended goals, the motivation, coordination and realization of technology and knowledge transfer processes should be enhanced by the effective intermediary role of cluster management organisations.

The *strengths* in terms of the KTT in national context are the following:

- The business-oriented innovation is one of the highlighted pillars of the programme of Hungary's recovery and progress ('New Széchenyi Plan')
- Instituted development policy measures initiated by the government
- Unequivocal linkage to propulsive industries at national/regional level
- Presence of world-class technologies at medium enterprises and big companies
- Relatively strong capacities and knowledge in RDI and educational sectors
- Presence of KTT institutes, initial network-based activities focused on cluster management organisations

Gaps in terms of the application of KTT-oriented strategy/measures are as follows:

- Relatively great number of small economical organisations with relative deficient in development funds
- The interests of knowledge and technology developments aren't balanced with the short term interests of small and medium enterprises (mostly established or privatised by domestic owners)
- Insufficient level of cooperation between supply (business sector) and demand (RDI institutes) side of knowledge and technologies
- Fear of sharing knowledge at individual knowledge-owners
- Relatively low number of stages for the initiation of technology and knowledge transfer processes (matchmaking and knowledge sharing platforms and events)

In the field of *potentials* regarding to the development we can underline the positive Hungarian attitude in the field of getting knowledge, presence of technology-oriented multi-national companies and knowledge-based domestic SMEs, application-oriented R&D/educational activities at domestic institutes and effective management at clusters in propulsive industries and KTT centres. To reinforce the competitiveness of entrepreneurial sector on both the domestic and the external market is important objective of the economy development programme of the Hungarian government; That's why the application of new, effective and efficient, productive knowledge and technologies is one of the basic interests of sustainable development. The most highlighted potential is the real economical

possibility and demand of the KTT in traditional propulsive industries (automotive, engineering, heavy industry, mechatronics, chemicals, food industry).

Based on the project-frames determined by the Partnership, the Hungarian project team has concentrated on practice-oriented strategic objectives and elements *focused on the KTT by the mediation of clusters established in propulsive industries in Hungary*. The schematic overview of these *strategic objectives and possible development measures* can be summarized as follows:

- Development and amendment of motivation and coordination of KTT' management. Development measures:
 - development of cluster management organizations of existing clusters via organizational development and process reorganization and introduction of new, relevant and profitable KTT services (e.g. ICT platforms, matchmaking & knowledge sharing events);
 - fostering the KTT cooperation or even mergers among Hungarian cluster management organisations operating in propulsive industries;
 - fostering international networking of clusters aiming to develop effective KTT with marketable outputs and long-term co-operation;
- Development of knowledge and technology level at business sector. Development measures:
 - supporting investments of the cluster member companies in the field of R+D, applied sciences and product development which has the real potential to reach the market
 - supporting application of market-oriented new technologies and procedures
 - fostering the practice-oriented knowledge of employees of business actors by on-the-spot trainings and exercises at more developed companies originated from same sector
- Increasing the efficiency of R&D and knowledge-producing institutions. Development measures:
 - supporting the development of work related high-quality trainings
 - supporting R&D activities conducted by universities, research institutions and their collaborations focused on business-scientific cooperation

Relevant projects

Title	SEETechnology (SEE project)
Year	2012-

Author	Budapest University of Technology and Economics
Description	The project is about co-operation of innovation-oriented intermediaries in SEE (South East Europe) area for the promotion of transnational market uptake of R&D results and technologies by SMEs. It's about creating the environment for innovative entrepreneurship.
Webpage	http://www.seetechnology.eu/#!home/c1nor

5 Conclusions for pilot development

As an important goal of the report, strategic pilot actions (project proposals) for policy development have drawn up and summarized in this chapter. Both the whole report and the pilot proposals are aimed at giving valuable input for the further activities of the project CluStrat. By overviewing the national state of the art, the extended aim of pilot actions should be in correlation with the market-oriented innovation of network-based economy by focusing on sustainable development of technology and knowledge in propulsive industries of Hungary. Based on the nature of the project, the focusing can be mentioned as inevitable factor. That's why the proposals, which are explained and unanimously accepted by the local project team, are classified in three key areas as follows: *project development, knowledge development and networking*.

Key area I. - Project development (highest priority!)

<i>Title</i>	Establishment of sustainable 'Project Pipeline Systems' at clusters in propulsive industries
<i>Description</i>	The Project Pipeline System would be run as one of the services provided to cluster members to whom it will be offered for free by cluster-management organisations. As a common cluster service, it would represent a strategic tool in the field of project ideas identification, collection and development. The main functions of the Project-Pipeline System would be as follows: Attention rising; Collect projects ideas; Support the development of the projects; Proactive use of the project-database; Project monitoring
<i>Key enabling actors</i>	Clusters and cluster management organisations related to propulsive industries of Hungary
<i>Contributors</i>	Intermediary Bodies related to the EU development policy (e.g. Implementing Agencies of Operational Programmes)
<i>Relevant clusters</i>	Bakony-Balaton Mechatronics and Automotive Cluster (automotive sector) Vertes-Duna Automotive Cluster (automotive sector) PharmAgora Quality of Life Cluster (pharmacology and life science industries)

Key area II. - Active ageing

<i>Title</i>	Cross-clustering between active ageing related clusters to develop a new product or service (at theoretical level)
<i>Description</i>	Active ageing related clusters and their member companies will create a group for the development of a new product or a service specialized for the elderly people to help

	their daily life, preserve their health conditions. The concrete idea of the new product or service will be developed and finalized during their meetings. The final output would be a feasibility study of the product/service.
<i>Key enabling actors</i>	Clusters and cluster management organisations related to active ageing in the region
<i>Contributors</i>	
<i>Relevant clusters</i>	PharmAgora Quality of Life Cluster (pharmacology and life science industries) Functional Food Cluster (Egészségvédő Élelmiszerek Klaszter) Innoskart IT Cluster

Key area III. - Internationalization

<i>Title</i>	Establishment of a complex programme to increase the international business attractiveness of the Central Transdanubian Region.
<i>Description</i>	The pilot project aims to implement a complex programme to raise the international activities of Central Transdanubian Clusters, to create new businesses and international co-operations. Through the elaboration of the pilot, one or two regions should be selected where there is significant opportunities and interests to co-operation vice versa. The main actions: creating marketing materials, organizing thematic matchmaking opportunities, B2B meetings and study/company visits.
<i>Key enabling actors</i>	Clusters and cluster management organisations, cluster member companies of CT and the other selected partner region(s),
<i>Contributors</i>	Hungarian Investment and Trade Agency, venture capitalists, other business actors
<i>Relevant clusters</i>	Bakony-Balaton Mechatronics and Automotive Cluster (automotive sector) Vertes-Duna Automotive Cluster (automotive sector) PharmAgora Quality of Life Cluster (pharmacology and life science industries) Innoskart IT Cluster