

REGIONAL SYSTEMS OF INNOVATION AND REGIONAL POLICY IN EUROPE

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Abstract:

European integration leads to convergence as well as divergence between the countries included in the integration process. For example, increased technological spillovers lead to convergence of the production processes used in the EU-countries, whereas specialization leads to divergence on production and sectoral distribution. This paper uses intercountry data of European member states, and also it's attempting to analyze the empirical patterns of convergence and divergence. Our aim is to address the problem of measuring how much of the convergence that we observe is due to convergence in technology. We will review the European model of regional development and the knowledge economy trying to examine and to measure the implications of innovation and technical change, in order to reach in some policy implications and in safe conclusions regarding the convergence and the catch-up process of European member states. By comparing these patterns with the theoretical expectations, the outcomes shed new light on the theories of regional policy and convergence in European Union.

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1. Introduction

This article argues that regional economic development ultimately depends on the technical change, social and human capital and civic entrepreneurship, among others. If so, technology in all its facets will be the crucial ingredient in regional improvement, in contrast with the usual regional pleas for better infrastructure, health care and banking facilities. We would like to tackle the following four issues in this paper: a) Why is innovation important for regional economic development ? b) Why is the regional dimension important for innovation promotion ? c) What has been our policy response so far and what lessons have we learnt from it? d) Finally, what are our action lines for the future? In this paper, we will try to analyse the regional systems of innovation, and to estimate the effects of technical change in the convergence process. This paper also questions the regional policy in Europe. To do this, it examines critically the claims of regional disadvantage and examines the factors that influence regional economic and social conditions.

2. Regional Policy and the Regional Systems of Innovation

Regional differences remain the prime sources of competitive advantage. A long-term approach to development of regional knowledge economies must therefore combine local (regional) bottom-up approaches with global or European top-down approaches. There is no contradiction between global and local approaches to development of the knowledge economy. Regional policy should evolve from supporting general R&D efforts towards innovation promotion. It should also change the emphasis from a “technology-push” into a “demand-pull” approach, to identify and understand the demand for innovation in firms in the less favoured regions. Technological transfer is essential for regions which are lagging behind. It might even be more important than the development of indigenous R&D activities in the weaker regions.

Regional policy should facilitate the identification, adaptation and adoption of technological developments elsewhere in a specific regional setting. It might be less costly, avoid duplicating previous

errors and reinventing the wheel. Regional policy should facilitate technology transfer and the flow of knowledge across regions, maximising the benefit of the European dimension by facilitating access from less favoured region's economic actors to international networks of "excellence" in this field. They encourage regions to take actions such as: a) Promoting innovation, new forms of financing (e.g. venture capital) to encourage start-ups, specialised business services, technology transfer, b) interactions between firms and higher education/research institutes, c) encourage small firms to carry out R&D for the first-time, d) networking and industrial co-operation, e) developing human capabilities.

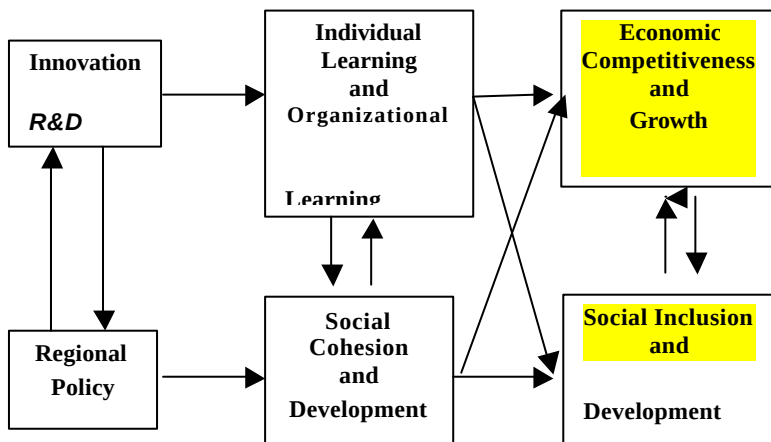
The theoretical framework for the concept can be found mainly in the work of Cooke and his colleagues. According to the author the first references to the term appeared at the beginning of the nineties and their evolution has its origin in two major theoretical currents. The first current originates in research on technological innovation, particularly that which refers to National Systems of Innovation (Lundvall, 1992); the second results from advances in theories of regional development. The discussion of National Systems of Innovation emphasizes the importance of innovations on national processes of development. These innovations are the result of the interaction between firms, clients, and government and research institutions, constituting an environment that is favourable to the learning of new ways of producing and of organizing production. One of the matters that is emphasized in this type of research are the processes through which this learning takes place and the roles carried out by the different actors that are involved. The concept of innovation that is used in this research is a broad one. It goes beyond new discoveries in activities and products on the frontiers of technological progress, to refer as well to changes in the production of less-elaborated products and to human behaviour, including changes in cultural values, routines and habits. At the same time, there are according to the authors several elements that indicate that the issues dealt with in this discussion can be better understood and analysed within a more restricted territorial environment, such as the region. This is where the second formative element of the concept of Regional Systems of Innovation enters the scenario. Through their

discussion of national systems of innovation and on regionalism within regional development, we can move toward the construction of a concept of regional systems of innovation. Consequently, the formation of knowledge can be seen as made up through two levels of learning. The first is the one that establishes competence – the ability to carry out a particular task – and the second, which establishes capability – the comprehension of the underlying mechanisms for the solution of a problem that the task involves, (Cooke and Morgan, 1998). Evidently, a learning system that develops capability is much more onerous than one that merely supplies competence. Thus, a regional system of learning can not restrict itself to the mere transfer of competence coming from elsewhere. This is all the more so due to the fact that all experiences are singular. From the perspective of economic development, we can not imagine that this whole framework to increase the capability of countries/regions can dispense with intense action on the part of the State. To the extent that this regional learning system interacts formally or informally with universities, research institutes, vocational training agencies, technology transference, technological parks and firms in general, it tends to become a Regional System of Innovation, (Cooke and Morgan, 1998). In 1997, the OECD proposed a more general strategy set for all (not just less favoured) regions. Although this was not specifically focused on Information Society issues, it has clear and direct relevance for the Knowledge Economy. The OECD study looked at the concept of *regional competitiveness* to explain why some regions successfully develop clusters and networks, a wide variety of manufacturing activities and of services for businesses and consumers, along with educational, research and cultural institutions, and why some must grapple with industrial and institutional imbalance and a lack of resources necessary to adapt. A territory's indigenous capacity for development is linked to the productivity of enterprises, their ability to join networks, the skills of the labour force and the strength of institutional resources. Such an approach stresses the (mainly) endogenous task of creating networks, partnerships and cooperation within the region, and five important strategies are recommended in this context: a). Use regional policies for human resource development. b) Give a demand-driven focus to human resource

development. c) Base competitiveness on the development of partnerships. d) Reinforce economic efficiency by policies of equity. e) Develop regional governance to consolidate national policies. Strategies (a) and (b) were subsequently refined into one of the most important current policy and strategy approaches for developing regions in a Knowledge Economy context, the learning region, (OECD, 2001a). This emphasises the essential role of skills and competencies in enhancing innovative capacity and regional competitiveness.

The learning region concept is seen as a heuristic framework for analysing key relationships and developing effective strategies for regional policy. At base, economic competitiveness at the regional level is determined by the quality of social capital, defined as the institutions, relationships, and social norms impinging upon the quality and quantity of social interactions within a society. In a broad sense it includes the social and political framework that shapes both these norms but also the relevant social structures. Social capital, in turn, moulds the types of learning and use and creation of knowledge which take place, resulting in economic competitiveness, but also in social inclusion if long term sustainability is to be ensured. Figure 1 presents the regional and innovation policies for the learning economy. Millard (1999) defines a learning region as one where an industrial cluster becomes a collective learning system, a concept drawing heavily on Lundvall's concept of national systems of innovation, fleshed out at local and regional levels. They argue that in such regions, learning organisations develop at three levels: 1) at intra-firm level, 2) at inter-firm level between firms interacting within a cluster, 3) at the institutional level, through public intervention to support organisational innovation in business services, research and training.

It is argued by some that the *learning region* need not necessarily be high-tech and that a learning region can be based upon one or more traditional manufacturing sectors. Malmberg and Maskell (1999) argue that the learning region permits the acquisition of monopoly rents, so that they become the basis of comparative advantage based on three characteristics of resource immobility.

Figure 1: Regional and Innovation Policies Towards the Learning Economy

Source: OECD (2001)

3. The European Regional Policy

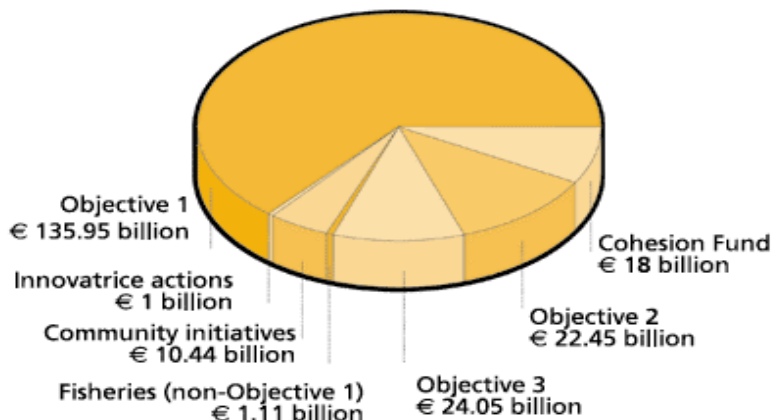
The European Union is one of the most prosperous economic areas in the world but the disparities between its member states are striking, even more so if we look at the EU's various 250 regions. To assess these disparities, we must first of all measure and compare the levels of wealth generated by each country, as determined by their gross domestic product (GDP). For instance, in Greece, Portugal and Spain, average per capita GDP is only 80% of the Community average. Luxembourg exceeds this average by over 60 percentage points. The ten most dynamic regions in the Union have a GDP almost three times higher than the ten least developed regions. The European Union's regional policy is based on financial solidarity inasmuch as part of Member States' -contributions- to the Community budget goes to the less prosperous regions and social groups. For the 2000-2006 period, these transfers will account for one third of the Community budget, or €213 billion: a) € 195 billion will be spent by the four Structural Funds (the European Regional Development Fund, the European Social Fund, the Financial

Instrument for Fisheries Guidance and the Guidance Section of the European Agricultural Guidance and Guarantee Fund); b) € 18 billion will be spent by the Cohesion Fund; c) 70% of the funding goes to regions whose development is lagging behind. They are home to 22% of the population of the Union (Objective 1); d) 11.5% of the funding assists economic and social conversion in areas experiencing structural difficulties. 18% of the population of the Union lives in such areas (Objective 2); e) 12.3% of the funding promotes the modernisation of training systems and the creation of employment (Objective 3) outside the Objective 1 regions where such measures form part of the strategies for catching up. f) There are also four Community Initiatives seeking common solutions to specific problems, namely Interreg III for cross-border, transnational and interregional cooperation, Urban II for sustainable development of cities and declining urban areas, Leader for rural development through local initiatives, and Equal for combating inequalities and discrimination in access to the labour market. According to the estimations of Hermin model, the estimated effect is to increase real GDP in 2006 by around 6% in Greece and Portugal and by 2.4% in Spain as compared with the situation without intervention. The effect is relatively modest in Ireland (1.8%), where the Structural Funds only account for under 10% of total public expenditure. The CSF will increase investment by much more, especially in Portugal (by 23%) and Greece (14%), which will add to effective demand via multiplier effects and, over time, also tend to increase productivity, through improved infrastructure and human capital as well as the use of more modern, and therefore efficient, plant and equipment.

Figure 2 presents the allocation for total budget for the structural and the Cohesion Fund for the period 2000-2006, whereas, Figure 3 depicts the Gross National Product and the operating budgetary balances. The effect on employment is likely to be significant, but will tend to decline after 2006, because of higher productivity. The principal effect is higher growth, which is estimated to continue beyond the programming period as a result of investment strengthening the supply-side, or the productive potential of the economy. The added growth in GDP averages between 1-1.5% a year for Greece and Portugal, 0.8% for Spain and 0.5% for Ireland.

The relatively small multiplier in Ireland and Portugal reflects the openness of the two economies, which means that a large part of the increased demand goes to imports, as well as the assumed 'crowding-out' effects on the private sector of higher public investment.

Figure 2: Total budget allocations for Structural and Cohesion Fund 2000-2006 (1999 prices).



The most popular objectives for regional foresight exercises are: 1) Informing Policy, learning Policy, building networks. 2) Promote Competitiveness, focus on regional issues, social orientation and economic growth. In recent years considerable experience with practices regarding the planning of regional policies in LDRs (Less Developed Regions) has built up with support from the EU, national and regional governments and local authorities. At European level, starting from the Structural funds reform in 1988, and more recently with the new regulations for the period 2000-2006, a new development planning methodology has been promoted which is inspired by the principles of greater responsibility for local institutions and greater interaction with and involvement of local actors. The Structural Funds and the Cohesion Fund cover currently about one third of the EU budget (roughly EUR 36 billion in 2004).

Structural Funds		Scope
ERDF		Objectives 1 and 2
ESF		Objectives 1, 2 and 3
FIFG		Regional Development Policy and Common Fisheries Policy
EAGGF	Guarantee Section	Expenditure from the CMO's resources Rural development measures aside Objective 1 Expenditure on Information measures relating to the CAP
	Guidance Section	Other rural development expenditure

Source: http://www.europarl.eu.int/factsheets/4_1_5_en.htm

The Structural Funds have three main priority objectives: Objective 1 : facilitate the catch-up for regions lagging behind in development. Objective 2: promote the socio-economic conversion of industrial, urban or rural zones or zones which are dependent on fisheries. Objective 3 : provide improved training and job opportunities. In addition, aid is also granted by Community initiatives which encourage cross-border, transnational and interregional cooperation throughout the EU (Interreg III) and equality in the labour market (Equal). The Cohesion Fund supports environmental and transport projects in the least prosperous Member States.

Table 1 presents the Community' aid to new member states. The EU's regional policy is based on financial solidarity inasmuch as part of Member States' contributions to the Community budget goes to the less prosperous regions and social groups. The new Member States will be eligible to 22 billion euro in 2004-2006. According to the European Commission, the EU has earmarked a 22 billion euro purse to finance all structural instruments in the ten new Member

States between the years 2004 and 2006. All newcomer states are eligible to such funding once they fulfill the related conditions. These conditions include full compliance with the implementation rules for the structural and cohesion funds as well as with relevant Community policies and legislation. The scheme for the implementation of structural funding was agreed on in December 2003.

Table 1: Breakdown of Community aid to new Member States 2004-2006 (in mil. euro)

Country	Obj 1	Obj 2	Obj 3	Interreg	Equal	Cohesion Fund	Total
Czech Rep	1454.27	71.30	58.79	68.68	32.10	936.05	2621.19
Cyprus	0.00	28.02	21.95	4.30	1.81	53.94	113.44
Estonia	371.36	0.00	0.00	10.60	4.07	309.03	695.06
Hungary	1995.72	0.00	0.00	68.68	30.29	1112.67	3207.36
Latvia	625.57	0.00	0.00	15.26	8.03	515.43	1164.29
Lithuania	895.17	0.00	0.00	22.49	11.87	608.17	1537.70
Malta	63.19	0.00	0.00	2.37	1.24	21.94	88.74
Poland	8275.81	0.00	0.00	221.36	133.93	4178.60	12809.70
Slovenia	237.51	0.00	0.00	23.65	6.44	188.71	456.31
Slovakia	1041.04	37.17	44.94	41.47	22.27	570.50	1757.39
Total	14959.64	136.49	125.68	478.86	252.05	8495.04	24451.18

Source: European Union, 2004.

4. The European Innovation Policy

The EU has played a major role in disseminating good practice in R&D policy by helping to create a «European Research, Technology, Development and Innovation Community», where decision-makers, researchers, and other interested parties can communicate and work together, in both formal and informal ways, in official advisory committees, specific R&D programmes and policy exchange initiatives. By assisting in this, and through its influence on policy

formulation and implementation, EU policy has indirectly contributed to closing the R&TD and innovation gap between member states and regions, and, by changing the culture, it has, in some respects, improved the policy planning process. To improve the quality of regional development strategies the Commission intends to support the latest ideas, which have not yet been adequately exploited. They are expected to provide the regions with the scope for experimentation, which they sometimes lack but need to meet the challenges of the information society and to make their economies more competitive. The Commission has laid down three working topics for ERDF innovative actions in 2000-2006: 1) the regional economies based on knowledge and technological innovation; 2) information society at the service of regional development and 3) regional identity and sustainable development. The European Union is increasingly becoming a knowledge-based economy and society. The development of knowledge has a direct effect on competitiveness and employment, as well as on the way society functions in general.

Tables 2, 3 and 4 illustrate the basic research and development data, research and development indicators and also the science and technology data for the European members states and the OECD' countries. Accordingly, the European Commission has concluded that a genuine «European Research Area» needs to be created to improve the situation. Member States need to consider policies on finance, human resources, the relationship between the public and private sectors, the creation of a common reference framework and values, and regional aspects. Regional and local authorities already support research, technological development and innovation. It is estimated that the finance they provide amounts annually to almost 1½ times the total appropriation of the EU Framework Programme (EUR 4.5 billion compared with EUR 3 billion), over 90% of which is allocated on a regional basis. The authorities concerned are best placed to form the links with companies necessary for innovation and, therefore, the generation of economic wealth and employment. Creating networks of knowledge, clusters of companies, linking the scientific system to the needs of industry and services are all easier to organise at local and regional level.

Table 2: Basic Research and Development Data, 2000.

	Gross Expenditure on R&D (GERD)			
	% of GDP	% finance by Gov.	% finance by Ind.	Per capita
Australia	1.51	47.42	45.51	346
Austria	1.80	38.82	41.00	486
Belgium	1.96	23.16	66.19	484
Canda	1.84	31.84	42.55	515
Czech Rep.	1.35	44.51	51.21	193
Denmack	2.09	32.55	57.95	577
Finland	3.37	26.23	70.25	848
France	2.15	36.94	54.11	518
Germany	2.48	31.44	66.11	643
Greece	0.67	48.70	24.16	107
Hungary	0.81	49.54	37.76	100
Iceland	2.33	41.16	43.41	645
Ireland	1.21	21.81	64.12	313
Italy	1.04	50.81	42.98	249
Japan	2.98	19.58	72.42	774
Korea	2.68	23.94	72.38	403
México	0.40	65.29	23.56	34
Netherlands	2.02	35.75	49.66	536
NewZealand	1.11	52.29	30.48	203
Norway	1.70	42.55	49.53	492
Poland	0.70	63.44	32.62	67
Portugal	0.75	69.68	21.32	128
Slovak Rep.	0.69	42.61	54.42	80
Spain	0.94	38.64	49.73	189
Sweden	3.78	24.48	67.76	888
Switzerland	2.64	23.24	68.96	797
Turkey	0.63	47.71	43.32	38
United Kingdom	1.86	28.91	49.27	453
United States	2.70	27.33	68.23	963
G7	2.47	27.89	65.31	730
EU-15	1.88	35.00	55.33	458
OECD Total	2.24	28.89	63.90	535

Source: Main Science and Technology Indicators, OECD(2002).

Table 3: Basic Research and Development Indicators

	Researchers, Full time eq.	Per 1000 total employment	% Gdp
Australia	62 790	7.2	0.44
Austria	18715	4.7	0.53
Belgium	30 219	7.8	0.47
Canada	90 810	6.1	0.57
Czech Rep.	13 852	2.9	0.19
Denmark	18 438	6.7	0.42
Finland	26 162	11.4	0.60
France	160 424	6.8	0.36
Germany	259 214	6.7	0.40
Greece	14 828	3.8	0.33
Hungary	14 406	3.7	0.19
Iceland	1 578	10.1	0.49
Ireland	8 217	5.1	0.26
Italy	64 886	2.9	0.33
Japan	647 572	9.7	0.43
Korea	108 370	5.2	0.30
Mexico	19 434	0.5	0.16
Netherlands	40 623	5.1	0.53
New Zealand	8 264	7.5	0.41
Norway	18 295	8.0	0.49
Poland	55 174	3.7	0.22
Portugal	15 752	3.3	0.29
Slovak Rep.	9 955	4.7	0.07
Spain	76 670	4.9	0.28
Sweden	39 921	9.6	0.81
Switzerland	25 755	6.6	0.61
Turkey	20 065	0.9	0.35
United Kingdom	157 662	5.5	0.38
United States	1 114 100	7.9	0.37
EU-15	919313	5.6	0.39
OECD Total	3 235 631	6.6	0.38

Sources: OECD (2001) and (2002).

Table 4.Science and Technology,2000: Balance and Patents.

	Foreing Receipts	Foreign Payments	Foreing Balance	«Triadic» patent Total	% of foreign co-inv.	Apply EPO ICT	Bio- tecnology
Australia	103	225	- 122	191	26	84	60
Austria	2430	2426	4	189	36	58	25
Belgium	5642	4235	1407	368	36	92	117
Canada	1995	1409	586	379	30	267	155
Czech Rep.	287	574	- 287	8	33	1	2
Denmark				205	21	83	82
Finland	107	413	- 305	296	14	440	26
France	2 755	3169	-414	1912	15	984	250
Germany	12994	17754	-4760	4807	13	1878	445
Greece				4	33	4	1
Hungary	216	504	- 288	23	33	8	0
Iceland				2	0	7	1
Ireland				25	70	29	5
Italy	2805	3503	- 698	728	14	194	53
Japan	8435	3602	4833	9903	3	3159	416
Korea				388	5	268	29
Luxembourg				9	78	2	0
Mexico	64	454	- 390	8	44	2	5
Netherlands				722	22	620	127
NewZealand	8	4	4	20	31	10	10
Norway	1057	1284	- 227	102	22	32	12
Poland	136	813.4	- 677	4	100	2	1
Portugal	294	677	-383	7	67	1	1
Slovak Rep.	23	64	-41	6	100	1	1
Spain	191	1025	- 834	86	33	48	19
Sweden	397	45	352	782	15	424	61
Switzerland	1563	1756	- 194	657	29	168	52
Turkey				2	100	4	0
UK	16096	8923	7173	1583	25	830	374
US	38030	16106	21924	12682	8	5078	2359

Sources: OCDE(2002a,b,c). % of Foreign Co-inv: % of Foreign co-investors.

In summary, we can state that there is a widening tendency for differences between European regions in the fields of innovations and new technologies and in particular in the subjects of Research and Development Expenditures per inhabitant. According to econometric evidence, we can also state that the European Union should improve the distribution of regional funds for research and development, in order to diminish these differences and to support researchers in the less favored regions, and consequently to affect the socio-economic and regional growth and convergence of member states (Guisan, Cancelo and Diaz-Vazquez, 1998). By pursuing their own interests, therefore, regional authorities can increase the momentum towards the establishment of a European Research Area as well as ensuring its effectiveness and consistency. The establishment of a European Research Area, however, is not confined to the most central and competitive regions. The instruments available - the Framework Programme, the Structural Funds and action at national and regional level - should be used together in a more coherent way, each according to its objectives, in order to enable all regions to participate fully in the area

5. Conclusions

The Regional Policy, supported through Structural Funds and a Cohesion Fund has created objectives that have thus far been moderately successful in reducing disparities between the regions of the EU15. Greece, Portugal, Ireland and Spain, the 4 countries, which qualified for the Cohesion Fund, witnessed almost an 11% average increase in per capita GDP from 1988-1998. The poorest EU regions on average saw the per capita GDP rise by almost 7% over the same 10 years. The funding provided through Regional Policy contributed significantly to these GDP increases. Moreover, the European research and innovation policy has adopted an approach oriented more towards innovation than technological excellence as such, better addressing the deficiencies of less favoured regions as a result. An improvement in the interaction between the deployment of the Structural Funds and research policy is important to accelerating the «catching up» of lagging regions. The Structural Funds can provide the necessary support for firms and research institutes in the latter to participate on equal terms in future research programmes.

Finally, in this article we have attempted to present the main milestones regional authorities should keep in mind when undertaking a foresight process. There are three sets of reasons: 1) Over the last decade, most regions throughout Europe have built their legitimacy as policy makers in the RTD & innovation development field. There is now a need to develop the next round of policies via a mobilization of regional stakeholders. Foresight approaches are very well suited to vision building activities of this type. 2) Because of the change in pace, this next round of policies should be quite different, moving from planning approaches toward more flexible and shared approaches. Here again, foresight processes, because of their mobilization and scenario building potential can be very valuable. 3) Last but not least, the need to root research and innovation policies in a regional social and territorial vision calls for policy tools capable of integrating different foci in one process; we have tried to present various examples of the foresight approach potential to develop such integrated policies. By drawing upon a number of exercises conducted in European regions over the last five years, we have set out in concise form some of the most important elements that must be considered when planning a foresight exercise. The above information indicates the precise future of the Regional Policy is yet to be determined. While the policy has been deemed to be necessary it faces many challenges ahead. While the results have been promising in the EU15 there are still technology, innovation, unemployment and infrastructure differences between the «European regions». The Eastern European Applicant countries face greater disparities. If all Member States combine the financial support of the Structural and Cohesion Funds with support for Regional Policy, in time disparities should be reduced and hopefully eliminated. Funding must continue to be offered to both the Current EU15 after Accession. If all countries continue to be supportive of the funding for those nations and regions lagging behind, a strong single European Market should be thriving in the future.

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