

The development of European Union common research and development policy and programmes with special regard to life sciences

Doctor's Dissertation

Dr. Gábor Pörzse

Semmelweis University
Doctoral School of Pathology
(Public Health and Health Science Research)



Supervisor: Assoc. Prof. Dr. Judit Forrai

Official examiner: Prof. Dr. Péter Mátyus
Prof. Dr. Pál Gergely

Chairperson of the examination board: Prof. Dr. Iván Forgács
Members of the examination board: Assoc. Prof. Dr. Emma Tahin
Assoc. Prof. Dr. József Kovács

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INTRODUCTION

In accordance with the strategy accepted at the European Council meeting, in March 2000 in Lisbon the Union must become the most competitive and dynamic knowledge-based economy in the world by 2010, one that will be able to achieve sustainable growth through more and better work and powerful community cohesion. The Council considered it indispensable to accomplish several tasks in order to achieve the goals set out in this strategy, among them creating a competitive, dynamically developing knowledge-based economy through, among others, the realization of the European Research and Innovation Area (ERA).

Later, at the European Council Meeting in Barcelona, 2002, evaluating the experiences of the Lisbon strategy execution, the Council made further efforts in the interests of achieving the aims set, among them measures the content of which will enable member states of the European Union to raise their Research and Development (R&D) expenditure to 3% of their GDP on average by 2010, in such a way that 2/3 of the input will be financed by the business community.

This process got under way at the next meeting of the European Council, in Brussels, 2005, when the Presidents and Prime Ministers decided to relaunch the Lisbon strategy, believing that science and innovation is the engine of sustainable development.

However, it is not only recently that the European Union has recognised the importance of R&D, innovation, and its role in sustainable economic and community development. This area was already being promoted in the 50s, at the very beginning of European integration. Therefore, I have considered it most important in my dissertation “to go back to the roots”, providing a historical and at the same time analytical evaluative review of community R&D policy, together with its activity from the starting point of its development until the present day.

Nevertheless, presenting the development is not an end in itself, as the Union’s support for Research and Development has not been self-explanatory. The aim of the Union was always that results achieved through its support should be beneficial in the widest possible circle, and should serve more profitably the needs of the European citizens. Therefore, by describing the historical development, I would like to put emphasis in my dissertation on the examination of how the Union’s R&D became the engine of community and economic development, how it

was built into common policy, how its advancement was supported, and how integration has been deepened in this field.

Over the past 20 years, right up to the present day, Framework Programmes have been playing a leading role in the European Union's research. The idea of working European research into the Framework Programme occurred at the very beginning of the 80s. The aim of its introduction was to fine-tune individual, national R&D activities, and to successfully divide tasks between the community level and national research frameworks. In the present paper therefore, I have also been trying to find answers to how the development of the Framework Programmes, together with changes in its structure, conditional system, and regulations and priorities has influenced the fulfilment of these expectations.

It is not surprising if a professional dealing with life sciences, pays particular attention in Research and Development to his specialised area. Emphasizing the role of life science research is of course not the only priority of this paper, as it is not necessary to stress the importance of this area in everyday economic and community life. The European Union, from the very outset, has acknowledged the importance of life sciences, and it is not by chance that support for life sciences has become the second biggest priority in the last two Framework Programmes. In the present paper I have therefore considered it important to outline separately the development of life science research, and also to identify how these directly or indirectly served the development of the sustainable economic and community system, how they were built in to the Framework Programmes, and furthermore how integration has been deepened in this case.

It is to be expected from a professional, working for years in the national field of Research and Development, to elaborate on how successfully Hungarian researchers have been and are joining the Union's research, especially the Framework Programmes. To answer these questions is not simple, as most of the national and European Union data and information are very difficult to access and very often imprecise and incomplete. Due to the special nature of the research area, the grant applicants, winners, administrative staff and decision makers are usually fairly secretive, as they are afraid to disclose scientific or business data, secrets, or just deficiencies. In the light of these experiences, I have tried to clean up and process the data available in the national and European Union public and closed databases, concentrating on the examination of the parts that were completely reliable, and emphasising the examination of Hungarian participation in the two last Framework Programmes in the field of life sciences.

Finally, two more subjects are worth mentioning. In a paper dealing with a historical review it is inevitable that the question will arise of what the difference is between this and other works written on the same subject. Several international and national papers deal with the presentation of the development of European Union research, and references to them are a basis of my report. While these documents concentrate mainly on the political and scientific background, I deemed it important to raise in the dissertation, besides discussing these matters, such important issues as its role in sustainable economic development, its competitive power, how it supports common policies and deepens the processes of integration, and how it responds to given challenges.

In describing a historical process, finding relations with the events of the current era presents the most difficult task, due to the lack of suitable reviewable documents, the complexity involved in looking into the subject, and even because of the ethical issues arising (e.g. tackling sensitive data, encrypting).

Besides, I should also like to mention that the publications elaborated referred to an earlier period, and did not include fresh and relevant information. At the same time in my thesis, I have intended to offer a complete review of the given field, from its foundation up until the present day, by elaborating the newest initiatives, tendencies and ideas for the future.

My work is also novel from the point of view of the given professional field, as according to the best of my knowledge no comprehensive study of this area of research has been made so far, that is to say, investigating the role of life sciences in the Framework Programmes. It is also worth mentioning that I have been involved in the investigating, processing and evaluating of data concerning nearly 10 years of Hungarian participation in the 5th and 6th Framework Programmes in the field of life sciences.

In the light of the above mentioned problems regarding the available public databases of the 4th, 5th and 6th Framework Programmes, I have tried to concentrate in my thesis on the processing, evaluation and comparative study of the information gained from winning research projects within the scope of life sciences. Nevertheless, I have not ultimately given up on my intention to undertake a more detailed review of the given professional field, covering every country and comparing the tendencies experienced in life sciences with the other priorities. However, as this lies outside the remit of the present work, it can only be left as a possible subject of my further studies.

MAIN OBJECTIVES

In accordance with the principles described in the introduction, the main objectives are as follows:

1st objective: to undertake a historical, analytical, and evaluative review of the development of the European Union's Research and Development (R&D) activity and to demonstrate how in the past half century the Union's Research and Development has

- become the motor of the Union and its economic development,
- been built in to the system of common policies,
- supported their advancement, and
- contributed to deepening integration.

2nd objective: to evaluate the role, place and effectiveness of the Framework Programme in the Union's Research and Development system by demonstrating:

- how the priorities, structure, condition system, and regulations of the Framework Programmes have been changing,
- to what extent the Union's economic and social development, together with its current problems, challenges, and ambitions, have contributed to the advancement aims and research domains of the Framework Programme, and how they could respond to these challenges,
- how the Framework Programmes adhered to the initial goals of their creation, that is, were they able to fine-tune the individual and national R&D activities, and divide effectively the tasks between the Union and national research frameworks,
- how the monitoring and evaluation experiences of the previous Framework Programmes have contributed to the elaboration of condition and regulatory systems for the next Framework Programmes, and to the increase in the efficiency of their realisation, and their effectiveness.

3rd objective: to undertake a comprehensive study of the most important issues of the Framework Programme, especially:

- how project types and financial systems applied to certain Framework Programmes contributed to the achievement of the goals,

- by what means the European Union tried to achieve extensive involvement of the activity of Small and Medium Sized Enterprises (SMEs), considered to be one of the engines of economic development, and whether these measures were effective
- what steps the Union took to widen the circle of participants in the Framework Programme, to make it more flexible, quicker, and bureaucracy- free, whilst remaining professional and well controlled,
- how the emphasis has shifted to the exploitation of the results of research activities, and how basic research has again come to the fore in the 7th Framework Programme,
- by what means the Union tried to raise interest in the business sphere interested in the research and utilization of results,
- what phenomena and challenges along the way to integration of the national R&D programmes led to the convergence of certain scientific areas and to the deepening of co-operation between different ownership sectors.

4th objective: to show the development of life sciences within the Union's R&D; to account for how this research has been:

- incorporated into the system of Framework Programmes,
- serving directly or indirectly sustainable community and economic development, and the Union's common policy,
- contributing to the deepening of integration, and what priorities and changes can be traced,
- able to play a role in the converging of technologies.

5th objective: to analyse the participation of Hungarian researchers in the European Union's research, especially in the Framework Programmes, and examine:

- what conclusions may be drawn from data evaluation of the winning projects,
- how successfully the Hungarian researchers were able to link up with the work of the Union, and in what fields were they most prosperous,
- with which member and associated countries have the Hungarian R&D institutions built up the most auspicious co-operations,
- which features and sector structures characterise the winning projects beneficiaries,
- if the special measures introduced by the Union concerning Small and Medium Sized Enterprises (SMEs) were successful from the point of view of the Hungarian participants.

HYPOTHESES

I would like to investigate in my dissertation the following hypotheses in accordance with the research objectives envisaged.

1st hypothesis: Research and Development has played an important role in the Union's life from the very beginning, through the advancement of integration, and this can be attributed to the challenges initiated by scientific and economic development, and this role has become increasingly significant and indispensable in the professional field. Common R&D policy has continued to be the engine of sustainable development and has underscored other Union policies and secured professional backgrounds.

2nd hypothesis: The establishment of the Framework Programmes has become a turning point in the field of European Union Research and Development. These programmes have contributed to the realization of greater homogeneity between national R&D activities, together with improvement in the critical quantity of knowledge, human resources and European competitiveness.

3rd hypothesis: With the progress in development it became increasingly evident that a single country, an economic sector, and a field of science alone is unable to answer the challenges of our time, therefore co-operation at the European level and collaboration between state and private sectors is even more strongly required than before, and these problems cannot be solved without an interdisciplinary approach.

4th hypothesis: Over the last decades, the importance of life sciences has increased in European Union research, especially in the Framework Programmes. Besides the importance of this professional area, some significant priority changes can also be observed, that are mostly the consequences of the Union's economic challenges and scientific developments. At the beginning of the XXI century, life sciences play an important role in converging technologies.

5th hypothesis: Hungary, considering its potential, has been successful in its joining of the European Union's Research Framework programme in the field of life sciences. Participation in the national research projects is characterised by success, the division of winners according to ownership and sector, activity of the co-ordinators, and involvement of SMEs, etc. They adhere to Union tendencies and reflect relations in the field of Hungarian R&D.

METHODS

Methodologically, the research of the dissertation is based on the processing of professional literature, the analysing of data and the conducting of personal interviews, together with personal experiences. In addition to analysing the sources, in many cases I applied a source criticism (for example in the case of interviews, and getting to know personal opinions, etc.) in the interests of ensuring objectivity of evaluation as far as possible. The paper deals with the investigated subjects in chronological order.

1. I have reviewed the parts concerning the historical background, and afterwards elaborated the related national and international literature. While researching the literature available on this subject, I have also used, besides the professional literature legal materials related to the European Union and also those referring to Hungary. Regular monitoring of the Union's programmes, events and activities, summaries of the professional bodies and the consequent replies of the Commission, together with their written instructions, have similarly been of great assistance to me. In my paper, I describe the activity of several Union programmes and organizations; in order to be familiar with them, I had to undertake intensive internet research and a thorough and methodological investigation into the information contained therein. Alongside the literature research, I have also used my earlier analytical investigations.
2. One of the main objectives of my paper was the analysis of Framework Programme data referring to life sciences. The diversity of the data and varying resources made it impossible to treat them uniformly, and it was necessary to apply different methods in the case of certain Framework Programmes. In the absence of the Union database concerning the 4th Framework Programme, I have collected information from the former winners of the projects in the field of life sciences, either by phone or through e-communication (oral-history). As the body of material collected through these methods has not attained an acceptable level of scientific and professional credibility, its analysis and processing was omitted from the dissertation.

In the case of the 5th Framework Programme no materials could be found in Hungary suitable for analysis and processing, and I only succeeded in receiving a few that were at the disposal of the European Union after long, hard year-long efforts. However, as

these constituted only a significant part, and not the whole of the data I required, I have undertaken to elaborate only a few of them in my dissertation.

In the case of the 6th Framework Programme I considered appropriate the analysis of the information in the closed database of the European Commission, called CIRCA. While analysing the data, I found here also several deficiencies and inconsistencies, which I attempted to clarify as far as possible through telephone conversations, although sometimes the intention to keep secret scientific and business results prevented me from obtaining complete data. In other cases, the type of the project or tender, together with various regulations, prevented the disclosure of complete data. (In a few cases for example, it was possible during the realisation of the project to decide on the distribution of expenses at a later stage.)

3. During the writing of my dissertation, and while collecting and analysing the necessary data, I have also used personal experiences obtained through earlier work in the field of Research and Development, and also through the work which I am carrying out in my present position. Without elaborating too far, I would like to mention my membership of the Programme Committee (PC) in life sciences of the European Commission, both in the 5th, 6th and 7th Framework Programmes, also my function as a National Contact Point (NCP) in the 5th, 6th and 7th Framework Programmes, my executive officership in the EU Liaison Office, as well as my trusteeship in one of the most important new Technology Platforms in the European Commission Member States Contact Group of the Innovative Medicine Initiative.
4. Comparative analyses are an important part of the dissertation, which I have used for the evaluation of the technological development concepts, as well as certain Framework Programmes and the tools, and financing systems applied in them.

RESULTS

In the following I would like to summarize the essential achievements of the thesis, progressing through the aims and hypotheses of the research. In reviewing, I would like to highlight where my research has resulted in the accomplishment of the ambitions, and to what extent it supported the validity of the assumptions.

1. In the dissertation, I have undertaken a comprehensive review of the development of the community Research and Development policy and programmes, and its main tendencies from the very beginning until the present day, by the means of processing related national and international professional literature. In outlining the historical development, I have pointed out that Research and Development has been playing an important role in the community's life from the very founding of the European Communities. It was already evident in the 50s that scientific potential and financial contingencies at the national level alone were unable to restore the lost power status of Western Europe. In recognizing this, it became necessary to usher the research capacities of the member states in the direction of joint co-operation projects.

By tracing the developments, I have pointed out that ever increasing American, and later Japanese and Southeast-Asian, pressure in several industrial areas has endangered the competitive position of the Community, and it has become more and more evident that there is an increasing technological gap between the USA and Europe. The European companies, due to their smaller sizes, more limited financial possibilities, and narrower internal markets were unable to compete with their overseas competitors. The Community could change this situation only by increasing Research and Development expenditure, and further consolidating resources. Nevertheless, experience showed that the results of measures taken were only partially positive. Member states were trying to keep the results of strategic research within their national boundaries, and to develop at Community level only those that were of less importance to them. They were also unable to reach joint agreement over whether the Community grants should be considered as complementary resources or complex supports to their national programmes.

I have pointed out in the thesis that the Maastricht Treaty, in the field of R&D, has meant a more mature development grade compared to the previous ones, and has conferred, at the highest legal level, the task of supporting the realisation of common policy to research and technology development.

In the paper, I have devoted a significant section to outlining the measures that led to the creation of the European Research Area. Based on the review of the background literature, I have evaluated the creation of the European Research Area as a response of the Research and Development field to the challenges of society and economic development, and in line with the objectives and hypotheses, I have emphasized the imperative contribution of R&D to the Lisbon and Gothenburg aims vis-à-vis the achievement of growth, employment and sustainability. I have also pointed out that, although the above mentioned measures had positive results, they have not substantially changed Europe's lagging behind of most competitors in technology and economics.

2. I have devoted much space in my thesis to outlining and evaluating the Framework Programmes, as starting from the middle of the 80s they have gradually become basic elements of Union R&D policy. In line with the objectives and hypotheses, I have proved that the significance of the Framework Programmes has far overgrown the role of being just one among the European Union programmes. Although their budget compared to the whole of European Union R&D expenditure is only 5-8%, in my evaluation it is clear that their importance and effectiveness is proportionally far higher.

In line with the objectives and hypotheses I have highlighted that the Framework Programmes have strengthened research co-operation between the member states, and have concentrated their resources on the aims that were difficult to accomplish at the national level. At community level they have yielded research results ensuring added value to Europe, have strengthened the scientific and technological base of the continent's industry, have promoted the Union's competitiveness, and as a whole contributed to socio-economic development. In mentioning the positive effects, I have also expressed the opinion that the Framework Programmes were less effective in the field of direct contribution to innovation. I have explained this weakness, based on professional reviews, by the fact that a central point of the Framework Programmes has always been the strengthening of the whole of the European research system, not innovation.

3. The European research and innovation system has frequently been criticised for the poor efficacy of the results' usage on the market. While reviewing this question in my dissertation I have identified several determinative processes. While proving the hypotheses mentioned in the paper, I have shown that it became evident to the European Union that, at the level of present scientific, technological and economic development in Europe, a single country, research area, and sector cannot possibly answer effectively the challenges of our time. There was no option other than strong international co-operation, a joint effort that spans the sectors, scientific fields and economic areas. Concepts built on multi- and interdisciplinary knowledge with a specific problem-solving orientation, and holistic technology development conceptions are exerting great pressure, from the management of Research and Development to demands on training professionals. In the interests of the successful accomplishment of projects built on technological convergence, and the establishment of research directions, interdisciplinary knowledge and the ability to interact, as well as to grasp the challenges lying within those projects, have become indispensable.

Europe recognised comparatively early that there is no competitive research without industry participation, and vice versa, that no competitive industry is able to develop without a research background.

In spite of this early recognition and efforts to adapt, the response of the Community has not been strong enough to restructure the international economic order from the point of view of competitiveness, science and economy.

The appearance of the new approaches (e.g. Technology Platforms), compared to the previous European restraint, has constituted a courageous and high-impact initiative, from which some significant changes are hoped. The portfolio of research management tools has substantially opened up in the direction of industrial application, which has resulted in stricter changes to co operational structures, as well as having a strong impact on the development of the European Union's pharma industry.

The introduction of long-term Public and Private Partnership (PPP) as a new tool within the framework of joint technological initiatives in the area of Innovative Medicine and Nanomedicine, has created a new framework for cooperation between profit and non-

profit organizations, joint budgeting, and legal and financial structures; it has made it possible for the industrial area and publicly financed Union projects to go public jointly, resulting in much stronger collaboration than before in this field. Through PPPs, the chance arose to involve the industrial area, which was for a long time only present on the market with its own internal development and minimal public-funded research. It is essential to stress that by focusing on pre-competitive processes, the transparency important to the industry has remained in place, thus using a part of the finances from the public research, they could save money and time for areas considered beyond basic research, but which do not yet reach the competitive phase of drug development. Thus the platform, which has greatly integrated industrial processes, has been functioning also as a selection mechanism preceding the pre-competitive stage.

4. This dissertation points also to the fact that European countries were lagging behind most of all in high technology products areas. Therefore their public support and the improvement of their competitiveness has increasingly come to the fore. This has resulted in a strengthening of R&D activity in the high-tech industry, and a widening of public cooperation in these fields as well. With this, and the intention to improve quality of life, life sciences have been commanding increasing attention in the field of Community R&D and Framework Programmes.

In proving the hypothesis, I am attempting to describe the importance of life science research in the years mentioned, and following the introduction of the Framework Programmes. I would like to emphasise in the dissertation that life sciences have been present in every Framework Programme, and their role has been continuously expanded year by year. Now, maintaining its leading role, it has become the second most financially supported priority after Information Technology.

Scientific, societal and economic developments have presented new challenges in this area, which have been reflected in the constant restructuring of the objectives and subjects given special attention. The analysis of the changes realised in the past decades demonstrates the process which led to the life science field acquiring a determining role in technological convergence.

5. The dissertation offers, in the absence of Hungarian literature on the subject, a comprehensive analysis of the historical development of the support of life science, and

their role in innovation policy in the European Union, as well some of its relevance to Hungary. I have investigated the participation of Hungarian organisations with the help of data collection and evaluation, among other methods mentioned, and I sum up the results in the following. (The following summary refers to the winning projects in both Framework Programmes, and the related part of the dissertation contains detailed conclusions).

- a. The percentage of the winning Hungarian projects in the field of life sciences in the 5th Framework Programme was a little lower (16.1%) than for all participants (not only Hungarian) (19.8%). In the 6th Framework Programme the percentage of successful applications with Hungarian participation (21.8%) was also behind that of all submitted projects (24.0%).
- b. The national researchers successfully participated in the international consortiums created for the project proposals. In the 6th Framework Programme many expected the failure of the small countries participating, with respect to the first appearance of new tools intended to form critical approach and unify large amounts of small medical research. In the case of projects with Hungarian participation the data has not concurred with these unfavourable expectations, as 60% of research organisations submitting successful bids used traditional instruments, and 40% used new instruments, and were consequently successful in realising large, Integrated Projects (IP) and Networks of Excellence (NoE).
- c. Among the foreign partners, in both Framework Programmes, the Germans took the leading role, and national researchers had no strong relations with new member states.
- d. The institutions maintaining coordination of the projects were mainly from countries that joined the Union earlier.
- e. In the 5th Framework Programme, 78.5%, and in the later 6th FP, 66.2% of institutions coordinating projects came from the state sector; and most of them (71.9%, and later 87.8%) represented the higher education and research sphere. Compared to the previous one, participation of the business sphere in the 6th Framework Programme decreased from 17.4% to 9.5%.
- f. A similar tendency prevailed in the case of all Hungarian participation in the consortiums (79.1%, and later 74.2%), with the exception that in this case participation of the business sphere was a little higher (19.4%, and later 20.2%).

- g. In the 5th Framework Programme, the proportion of SME participation in supported projects with Hungarian participants was more than 6%, while in the case of supported projects realised not only with Hungarian participation, it did not reach 3%. In the 6th Framework Programme, the rate of SME participation in the case of Hungarian projects was already 15.2%, and with respect to the whole turnout, the proportion was 17.2%. All this shows that measures addressing the involvement of small enterprises started to achieve significant success only in the 6th Framework Programme.

CONCLUSIONS

In the dissertation, I have determined the most important objective to be providing a complete review of the development of common R&D activity in Europe and its most important tendencies, especially concerning the Framework Programmes, launched in 1984. I have emphasized the importance of life sciences with respect to these, and considered it important to outline and evaluate the founding of the organizations, announced programmes, and results achieved. The analysis of this area of research seems to be lacking in the Hungarian literature, similarly to the survey in the present paper, which relies on statistical data and tries to investigate the success of the activity and results of Hungarian participation in the latest Framework Programmes in the field of life sciences.

Prior to preparing the dissertation, I formulated some hypotheses in line with the set objectives, subject of research, and my professional experiences. I have elaborated and used a research method appropriate to the achievement of the set objectives and the proving of my hypotheses. In outlining the methods, I have mentioned those barriers that obstructed complete and reliable access to data.

Based on the results presented it may be stated that the hypotheses serving the objectives have been proved. I shall draw conclusions and outline future research possibilities without repeating these objectives, hypotheses and results.

1. Research and Development has played a decisive role in the life of the European Union from the very start, and provided a background for common policy as the scientific and technological base for the meeting of societal and economic challenges. Although member states have put a huge amount of financial and human resources into this area, Europe has not only been unable to gain a leading role in the ever-increasing scientific and economic competition, but has found it ever more difficult to keep up with the competitors. From the research made so far I may conclude that in spite of the many results achieved, Europe is prevented from making up this ground as it would desire mostly because of the lack of financial and human resources which stems from the difference in spheres of interest between member states and within single countries, improper coordination, cooperation, organisation of science, evaluation methods and financial structures.

2. The Framework Programmes have achieved the results and met those expectations that were envisaged for them upon their development (to harmonize research and pull together resources, etc.) A number of monitoring reports, independent evaluations, and research have borne out the progressive role of the programmes, upholding their indispensable value and suggesting their continuation.

Alongside these favourable opinions however, one should note that the structure, financial sponsorship, and regulations of the Framework Programmes have been and are constantly changing, which are not always and necessarily the result of newly arising challenges. In my opinion, in many cases the Union has been unable to achieve breakthrough results with respect to those issues that block its efficient functioning.

Sometimes one has the feeling that a response to a given question later causes problems in a different context; consequently, measures are not always well thought-out and in tandem with each other. (I could mention as an example the issue of concentration, focusing and sizing of the project. The Union has been criticized many times for the fact that resources for research are broken up, and therefore cannot constitute a strong force, and there is a need to concentrate resources. In line with these aspirations, a much greater emphasis than before has been put on the support of larger-scale, integrated projects and frameworks. This approach later received a fair amount of criticism for not allowing smaller organizations with valuable scientific knowledge to join the Framework Programme. Similar to this example, there is also a doubt surrounding the judgement of basic and applied research, and development and innovation as well. Sometimes the decision makers are inclined to refer to the “European paradox”, and in certain periods are deciding to put less emphasis on basic research, considering innovation to be all-powerful and taking steps to balance them out only years later.)

It would be desirable to strengthen the role of Small and Medium Sized Enterprises (SMEs) in the Framework Programmes. In place of the tools used until now, mainly increasing resources and positive discrimination, it would be necessary to elaborate a specialised and effective structure for the SMEs, similar to the Technology Platform initiative. In such a structure, an instrument adjusted to the Framework Programme can be realised, worked out in accordance with the needs of many small players.

I have envisaged as a goal for my future research an investigation into the means by which it would be possible to eliminate “downturns” during the formation of the Framework Programmes, and how those problems may be treated that really decrease the effectiveness of the programme and the results of the participants, and as a whole the efficiency of European Research and Development.

3. In the dissertation I deal especially with life sciences, offering a detailed overview of its half -century history, the work of a number of institutions created in this span of time, and the content of the programmes realised. Investigating the life sciences area, we cannot ignore the fact that so many organizations, programmes, efforts and resources have not led to a substantial improvement in the scientific and economic position of Europe compared with its competitors. The answer in many cases regarding this field does not differ from that given in the 1st point. The reality is that some national government agreements or EU institutions do not always meet with the full concurrence of private and government organisations. That is to say, the decisions taken at the top do not always have enthusiastic adherents whilst in the process of being carried out.

Support for life sciences within the past decades has undergone substantial priority change. However, in my mind, the shifting of priorities was not the result of a conceptual and well thought-out professional evolution, but rather an attitude forced by professional, scientific and political needs, and which have demanded the introduction of new tools, methods and regulations.

- 4 I have already referred to the shortcomings in the data related to participation in the programmes. In any case, my experiences gained during data collection were useful in the respect that I would like to suggest, in the course of my future research, the creation of an appropriate and far-reaching national and European database. I am also planning to investigate the whole scope of life science activity, including other countries participating in the latest Framework Programmes, based on the recording and analysis of data. I consider as a possible further orientation for my research the analysis of Hungarian participation in other professional fields of the Framework Programmes, and also the introduction and realisation of a complete Hungarian database containing the most complete possible data. I also deem it imperative to investigate in the future how international co-operations formed in the Framework

Programme fared later, together with the effectiveness of the researchers and organisations' further research activity, and the intellectual property rights of the R&D results.

I have chosen the following Aristotle saying as a motto for my dissertation: "Only the person who observes a matter from the very start, through its development and follow up, sees the heart of it."

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LIST OF OWN PUBLICATIONS

Contributions to the dissertation:

- G. Pörzse, Life Sciences, Genomics and Biotechnology for Health. In: Á. Szitáné Kazai (Editor), The European Research Area and Hungary. An R&D Deputy State Secretariat of the Ministry of Education publication, Budapest, 2002. Pages: 26-29.
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