

The History of Funding Research & Development in Slovenia

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Abstract

In this study we give a historical overview of developments in the field of financing research and development activities in Slovenia. Historical overview of developments in that area starting with the establishment of the Fund Boris Kidrič in the 1953. The Fund's task was to decide independently, separately from the government mechanisms, on awards to the excellent and scholarships to the most promising researchers through its management board consisting of renowned researchers. The government later transferred powers in funding research to the Fund. The Fund's effect on the development of science in Slovenia kept growing until it became the only funder of research in Slovenia oriented towards long-term and common objectives of the development of Slovenian society, when federal funds were abolished in 1971. The Research Community of Slovenia established in 1971 provided through its expert bodies the base for the Management Board of the Fund to implement the research policy on which funding decisions were founded. The Ministry of Science and Technology and later the Science Office of the Ministry of Education, Science and Sports continued to formulate the research funding policy in independent Slovenia. The Slovenian Research Agency has been funding with government budget funds a major part of research since 2004, in accordance with the interests and policy of the Ministry of Higher Education, Science and Technology.

The paper presents data for 1954-2010 on funding of research obtained from annual reports of institutions responsible for research in Slovenia.

Introduction

The first part gives a historical overview of funding research in Slovenia between 1954 and the disintegration of Yugoslavia. The crucial events and turning points on which the competent persons for research policy reported and informed the public are listed.

This is followed by a presentation of R&D funding between 1954 and 2010, as reported annually by the research funding institutions.

Publicity of the work

The Boris Kidrič Fund paid great attention to the publicity of its work. In addition to regular annual public meetings of the Management Board, the Fund

published annual reports containing all information necessary to keep the public informed. The first volume contains the report for 1954-58, the second for 1958-59 and the third for 1960-61. The reports have been issued annually from 1962 to the present with all legal successors having the main task of funding research from the government (of the republic and the country) budget maintaining the tradition. With the development of IT, the emphasis has been increasingly given to the Internet and the reports on the work in Slovenian are available on <http://www.arrs.gov.si/sl/finan/letpor/>. The issued and publicly available reports on funding research place Slovenia side by side with the US National Science Foundation, which issued its first report for 1950-51 (First Annual Report of the National Science Foundation 1950-51, http://www.nsf.gov/about/history/ann_report_first.pdf).

The main source of this paper and the analyses were the annual reports. The presented funds were mostly those of the following legal entities:

- Boris Kidrič Fund (BKF), established in 1953 and distributing the first funds in 1954;
- Research Community of Slovenia (RCS), starting to operate in 1971;
- Ministry of Science and Technology (MST), established in 1991;
- Ministry of Education, Science and Sports, Science Office (SO MESS), continuing the work of the MST since 2001;
- Slovenian Research Agency (Agency), beginning its work on 1 October 2004.

The term "the beginning" in this paper relates to the beginning of operations of the Boris Kidrič Fund as a legal predecessor of the Slovenian Research Agency. The science policy and systematic funding of Slovenian science was first established in the mid-fifties of the previous century (more by Aleš Gabrič in Znanstvena politika v Sloveniji po drugi svetovni vojni in vloga Antona Peterlina – *The Science Policy in Slovenia after the Second World War and the Role of Anton Peterlin*).

The beginnings

The People's Assembly of the People's Republic of Slovenia (PA PRS) adopted the law on the Boris Kidrič Fund in 1953, a year after Boris Kidrič died. Giving the fund the name of Boris Kidrič was a result of his great support to the development of science and to general progress. Several methods for participating in promotion of scientific research had been formed upon the Fund's establishment, mostly granting awards and training. The statute regulating the Fund's work was adopted in 1955. The statute of the fund was supplemented and the Fund's tasks expanded a year later due to a law amending and supplementing the law establishing the Boris Kidrič Fund. The Fund's tasks mostly comprised the following:

- 1.) giving Kidrič Awards for the best original scientific work published in the preceding year;

- 2.) giving awards for theoretical and applicative theoretical papers put forward on the basis of a call specifying the topics of the awards;
- 3.) giving awards for technical inventions and improvements;
- 4.) granting scholarships;
- 5.) funding basic and applied research;
- 6.) added later: granting loans for research equipment.

The first Kidrič Awards for scientific work were given in 1957. The Kidrič Awards were given for high quality original scientific research work in economics, and social and natural sciences published in the preceding year; One first award and not more than three second awards could be given each year. The main criteria were the scientific and expert value of the published work and its recognition among scientists. An award for life accomplishments could be given to scientists exceptionally.

The awards for successfully discussing predetermined topics were given for the first time in 1955. Eleven topics were selected in 1955-57, all of which concerned economically or technically significant issues. Five topics were prescribed in 1958.

A competition for technical inventions and upgrades established in practice was published in 1956. The first such award was given in 1957.

The decision to grant the first scholarships for expert training in the country or abroad was taken in 1954. Scholarships were granted in the initial period to candidates who were already employed. Full-time secondary school and university students received the scholarships only exceptionally. The Boris Kidrič Fund granted the first five multiyear scholarships for domestic educational institutions, two once-off grants for expert training and study trips in Yugoslavia, and five scholarships for specialization studies abroad in 1954. The same number of scholarships was granted in the following years with an increase in scholarships for multi-year studies in domestic schools. The number of candidates being granted scholarships for studies at home and for expert training abroad by 1958 was 34 and 21, respectively.

In 1956 and 1957, the Fund financed 19 scientific research projects with the results directly benefiting the Slovenian

economy. The Fund expanded this activity in 1958. The Fund took over the management of all budget funds earmarked by the republic for scientific research.

The Fund's statute stipulated that its "aim was to promote theoretical and practical research work in economics, and social and natural sciences as well as in all other fields directly assisting the development of the socialist economy". The Act amending and supplementing the Boris Kidrič Fund Act adopted in 1961 extended the Fund's activities to scientific research in all fields of social activities. The new task of the Fund was to promote and support theoretical and practical research in all scientific fields by: (1) funding scientific research, (2) giving awards, and (3) granting scholarships. The new law stipulated that the Fund may finance purchases of equipment needed for scientific research. The first modest funding of research equipment was granted in 1962.

The federal scientific fund and the scientific funds of republics were established in 1961. Their core task was to link scientific institutions and the users of scientific findings and achievements. A general principle was adopted of co-funding only scientific research for which funding is also provided by scientific institutes, businesses and other organisations. The funds would only exceptionally fully finance any scientific work. The Boris Kidrič Fund took over those tasks in full in the People's Republic of Slovenia.

The Management Board of the Fund found in 1962 that the main issue in Slovenia was not underdevelopment but insufficiently modernised production, reflected in low labour productivity, poor quality and choice of products, high costs, lack of adaptation to the market and low exports, in short, lagging behind in the global division of labour with regard to techniques, technology and organisation of production. The Management Board thus made an effort to fully include science in production. Science was becoming a responsibility of businesses but only few of them in Slovenia were aware of the matter's urgency. Some data had already foretold a change: the year-end accounts of 17 scientific research institutions in technical sciences show that the share of research funding provided by businesses and by the funds of the federation, and the republics in the

preceding year was 85 % and 15 %, respectively.

Funding research from the budget

The Management Board of the Fund was developing all forms of assistance to scientific research based on calls for proposals (except for the Kidrič Awards and the Fund's awards) with participation of over 200 renowned scientists and experts. Great emphasis was given to co-funding research as that multiplies the funding of science and in particular gives a better guarantee that the research will be performed efficiently and effectively as well as that it will receive a proper assessment.

The Fund's work increased significantly in 1963. The budgeted revenue was 1,800 million dinars, almost matching the entire amount available to the Fund since 1954, the year its work began. The Fund's budget was growing and stabilised at a percentage, which was 5.6 % of the budget of the republic. Thus, the funding of research grew in line with the rising income in the republic. The Fund managed most of the budget funds earmarked by the republic for research. Gradually, that included funds previously earmarked for research in other funds, e.g. the School Fund, or directly in the government budget, or directly in the People's Republic of Slovenia. That was implementation of the principle that research institutions receive no grants with their activity being financed instead. Research units at universities began to receive funding according to that principle as well that year.

The Fund's aim was always to attract funding from as many users of research as possible. The users contributed 42 % of research funding as early as in 1961. A year later their share rose to 48 %. In 1963, it climbed to 54 %.

The efforts aimed at improving efficiency and effectiveness of research were intensified. Participation of users in funding of research provides a certain guarantee that the funds will be soundly invested and the research aim achieved. Financial participation of users was growing into guiding and planning research work. The users found out that individual projects proposed by researchers were necessary but meaningless on their own. They gained sense only when they were linked together. The Fund took the ini-

tative to improve the organisation and planning of research. The discussion included representatives of research organisations and businesses, the Science Council and the Chamber of Economics and formed the initial draft of the methodology of planning and organising research, and introduced grouping, coordinating and guiding towards solutions of certain problems in handling of research topics.

Scholarships were an important area of the Fund's activities. The Management Board of the Fund more than doubled the amount for scholarships in 1964 because only adequate human resources can perform increasingly complex tasks.

The Management Board reported in 1965 on the enhanced development of the society in all fields. Growth in the number of research staff, the number of publications, etc., shows that the volume of research doubles every 12 years. Funding of research grew faster than the economy, meaning that research began to encompass increasingly wide areas of activities. The Management Board strictly applied the policy of co-funding by interested organisations, primarily in R&D. Co-funding by interested organisations reached 50 % for technical sciences and 38 % for biotechnology in 1964. The share was 30 % even for medicine and social sciences. In conjunction with the co-funding policy, lending for research tasks (notably in technical sciences) was becoming increasingly common. It rose from 10.5 million in 1962 to 110 million a year later and 265 million dinars in 1964. Loans for additional equipment of research organisations rose as well, in particular for funding semi-industrial devices as a necessary link between laboratory results and industrial production. The loans grew from 18 million in 1963 to 230 million dinars in 1964. The Management Board noted a particular problem, i.e. publication of achieved research results and found that a number of research findings had not been published in research literature, had not become available to researchers and experts and thus could not be subject to an extensive qualitative assessment.

The Fund's financing from the government budget of the republic had been increasing until 1964. The growth stopped in 1965. Although the Fund was merged with the Geological Research Fund that year, the combined funding of the two funds fell below the

1964 level after the adopted amended budget of the republic. The Fund raised a short-term loan to offset the lower than planned budget funds but its repayment was fully debited to the next year's budget of the Fund. This had an effect on funding of research projects in 1966, although the funds from the budget of the republic were higher in 1966 than in 1964.

The Federal Commission for Nuclear Energy significantly reduced the funding of all three nuclear institutes and research in nuclear materials in 1967, shifting a part of the financial burden to the republics. The new obligations placed a burden on the Fund that prevented it from increasing funding of research projects and tasks in other fields.

The structure of the Fund's funding of individual fields was relatively stable (source: Poročilo o delu, 1968, p. 7).

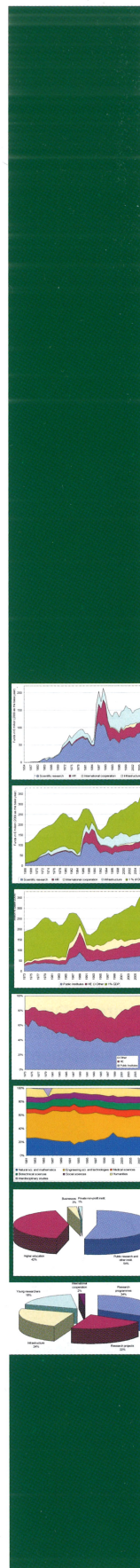
Technical sciences	46 %
Geological research	21 %
Biotechnology	14 %
Medicine	6 %
Social sciences	13 %

A large share of funds was earmarked for geological research aimed at searching for domestic energy sources.

Co-financers paid 53 % of the total cost on average for the tasks co-funded by the Fund. Businesses contributed 48 % on average, the Federal Fund for Financing Research and Geological Research 34 % on average and the remaining funds were own funds of institutes and those paid by other interested parties.

The Act on Permanent Funding of Research adopted at the end of 1968 stipulated a slightly higher growth in the Fund's budget than the forecasted domestic product growth until 1973.

An imbalance between the budget of the federal fund and the funds of republics for research funding was reported in 1969. The Federal Fund received nearly 60 % of all research funding from the federal budget, while all the funds of republics received only slightly over 40 %. Federal projects were not always aligned with interests of the republics, but the republics were nevertheless forced to co-fund such programmes if they wanted to receive co-funding from the Federal Fund for their research institutions.



The Federal Fund for Financing Research was abolished in 1970. The federation waived the part of personal income tax from which the federal fund was financed. The republics earmarked the released funds for the same purpose and transferred them to their research funds, thus providing for continuity of funding.

The Fund received a substantial boost in funding, which provided it with a new quality. The bulk of the new funding was used in the first years for the assumed obligations of the Federal Fund.

The Research Community of Slovenia (RCS) began its work in 1971. The focus of activities of the RCS was on guiding the development, and organisation and coordination of research, while the Fund implemented the policy by funding research programmes, projects and by lending for equipment and development research. The decisions on funding were transferred to a wide circle of researchers organised in sections to assess the scientific and social value of proposals. The principle of public panel discussions in approval of research programmes and publication of all data was applied. The Raziskovalec (Researcher) bulletin was first issued that year, regularly publishing information and new developments in Slovenian science and scientific institutions. Activities of the RCS extended to parallel activities, such as IT, scientific journals and international cooperation.

The Constitution of the Socialist Federal Republic of Yugoslavia was adopted in 1974. Adoption of a new constitution of the republic followed, which introduced self-management agreements and establishing self-management interest communities. The Research and Research Communities Act adopted in December 1974 placed the responsibility for programming, developing and research funding on workers joined in new self-management interest communities. A new research community was established a year later as the community of researchers and users of research, which ended the transition from a period when only the government cared for the development of science to a period when full responsibility was placed on the directly interested workers joined in self-management interest communities.

The self-management agreement on the establishment of municipal and regional research communities and the research community of the republic was adopted in 1976. The research policy was within that framework formulated more under the influence of researchers than on the basis of recognised and evaluated needs of the society. Research projects and programmes had a well-established role and interest of researchers and a poorly defined role of users. The Agreement on the Foundations of the Social Plan of the Socialist Republic of Slovenia 1981-85 was adopted to resolve the issue. The planned objective of spending 2 % of the domestic product (DP) on research was set. All forms of interest associations were established: municipal research communities (in 54 municipalities), special research communities (12), units of the research community (the unit for discovering and researching raw materials of general significance was included in the RCS) and the joint research programme within the RCS.

Declining trends in Slovenian science after 1980 resulted in a decrease of new doctors and masters of sciences, and a reduction in R&D units in business sector. There was an economic crisis in the country and abroad, stagnation (though the economy kept expanding), real personal income was falling, social standard stagnated, high inflation undermined many efforts to improve the economic outlook and foreign debt was high. A system of solidarity caused irrationalities.

Importing of scientific equipment was liberalised in 1985 and the imports of foreign scientific and expert literature stopped falling. The medium-term plan and the annual implementing resolutions specified an increase in the share of funds for basic research, all forms of postgraduate education, linking with the world and for innovative joint research projects.

The improved social conditions resulted in doubling the funding of research. The 1987 report stated that the funding more than doubled in 1986 compared to the year before: the nominal increase was from 6 billion dinars and in real terms it grew from 0.35 % of the domestic product to 0.72 %. Funds for promoting training of young researchers were specifically earmarked that year.

A graphic presentation of funding research & development

The presentation uses 2009 as the base year for calculating the funds. Retail price indices were used in the calculation for the years until 1998 and consumer prices indices for the years

ing also the cost of invited foreign scientists;

- infrastructure comprising the following items: scientific and popular science publications, scientific meetings, information & documenting activity/INDOK, ARNES, research equipment, capital investments, research infrastructure, innovations fund, building investments/investments of national importance, Academy of Science and Arts, founder's obligations,

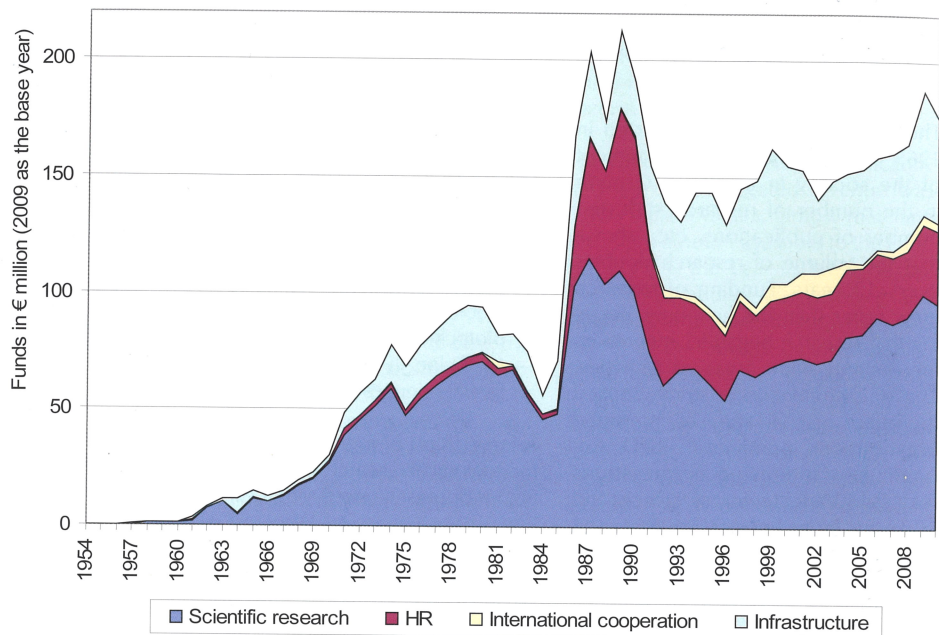


Figure 1: Funding of research & development by set

thereafter (source: Statistical Office of the Republic of Slovenia).

The figure presents funding between 1954 and 2010. They were combined into four sets for improved transparency:

- scientific research comprising the following items: scientific research (until 1980), research programmes of the RCS and the PoRS/GRP (guided research programmes), the programme for discovering and researching raw materials/unit, basic, applicative and R&D projects, targeted research programmes, research programmes and technological development;
- human resources comprising scholarships and training of young researchers;
- international cooperation compris-

awards, promotions, the expert system, operating costs of research organisations (acquisition of fixed assets, wages and salaries, and costs of material).

The figure presents only the funds of the ministry responsible for science after 1991 and only the funds of the Agency after 2004.

The figure above shows a distinct rise in funding until 1971, when the Fund began to manage all funding of research and development of the republic. The funding then experienced increases and decreases reflecting on the one hand the level of support to research and on the other the socio-economic situation described in the first part of the paper.

The next figure adds a dimension of domestic product and gross domestic product to the funding of research and development (presented in Figure 1). It presents the funding since 1966.

and falling DP/GDP had an effect of reducing funding of R&D. There was a lag in falling of the funding of R&D, thus the funding of R&D was the closest to 1 % of DP/GDP, when a crisis

struck or towards its end. It is a reflection of the awareness on the importance of investing in R&D (in particular when times are tough) and a decision to maintain for as long as possible the same share of R&D funding in the government budget.

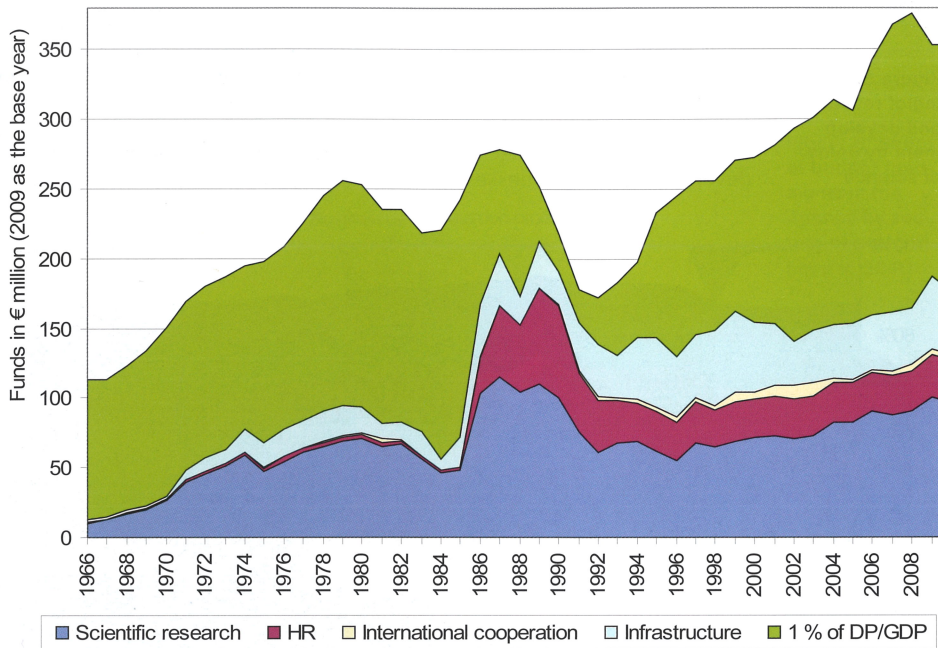


Figure 2: Funding of research and development by set and 1 % of domestic product (DP) or 1 % of gross domestic product (GDP)

Below is a presentation of R&D funding from 1973 onwards by recipient type. Recipient types have been combined into three groups with regard to the sectors of performance. The first group comprises organisations having the status of a public research institute (PRI) since 1991. The term “national institutes” was used for them before 1991 and now they are often known as the government sector. The second group comprises universities and their members (schools, academies and higher education institutes) and independent higher education institutions. The third group includes all other organisations (legal and natural persons) not classified into any of the previous two groups: institutes (public and private), businesses (Ltd, Plc, etc.), sole proprietors, private researchers, agencies, societies, international organisations, etc.

The organisations and their legal predecessors are classified into groups with regard to their current legal and organisational status.

The figure above shows data on the DP until 1979 and on the GDP since 1980. The source is the Statistical Office of the Republic of Slovenia, which collected data on the DP. The comparable data for the GDP are available from 1980 onwards (<http://www.stat.si/indikatorji.asp?id=20>, http://www.stat.si/letopis/1990/1990_07.pdf). The presented changes in the DP and the GDP reflect three crises: the oil crisis in the eighties, the disintegration of Yugoslavia in the nineties and the recent financial crisis.

Recalculating money to a common denominator is tricky for periods of high inflation and major fiscal changes or measures. We have used the same indices for recalculation of funding of research and development and for the DP and GDP and we therefore assume the data to be comparable. The figure shows a similarity between funding of R&D and the DP/GDP. Growing DP/GDP resulted in rising funding of R&D

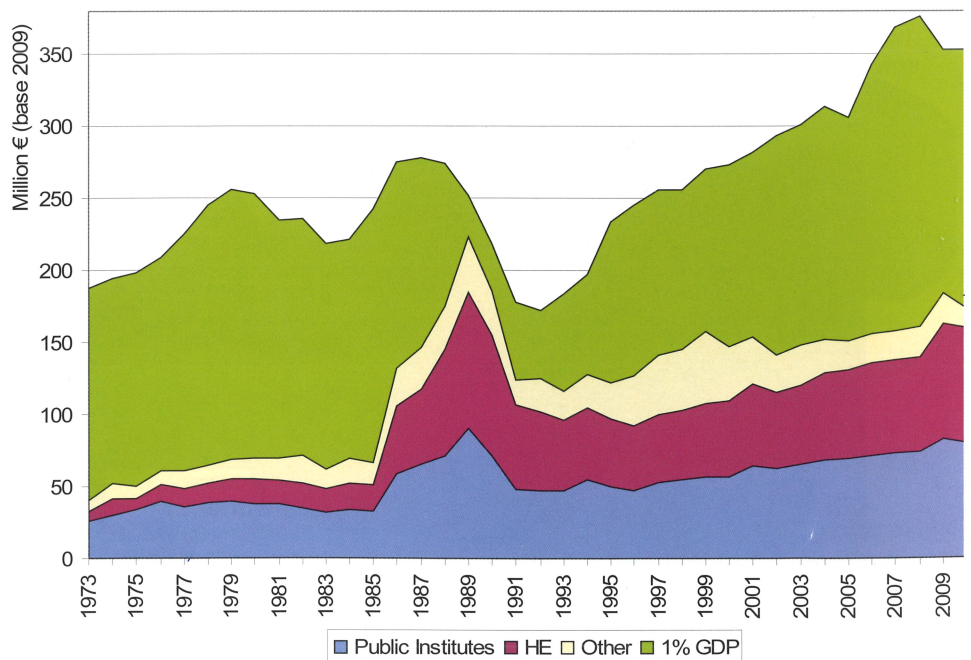


Figure 3: Funding of research and development by activity sector of the fund recipients and 1 % of DP/GDP

Until 1994, the reports on the work specified data only for fund recipients that we now know as “research organisations”, i.e. organisations (including natural persons) entered in the register of providers of research and development. The same category includes researchers entered in the register of private researchers. The data for all recipients of R&D funds have been available since 1995, which is why there is a noticeable relative increase in the funding provided to that group of recipients.

The R&D funding by sectors of performance is more stable and fluctuates less than the total R&D funding. The funds were relatively stable until 1985 and were not significantly affected by the crisis around 1980. The funds began to grow after 1985. A distinct fall was recorded in 1990 and 1991. It was followed by relatively stable slight increases.

Below is a presentation of R&D funding by fund recipient with regard to the sectors of performance. Funding provided to the government sector (i.e. the PRI) had been falling in the observed period from more than 60 % to less than 50 % until 1990, after which the share remained virtually the same. In the period when the PRI were losing funding, the relative winners were “university” recipients – a result of establishing research institutes at universities and thus enhancing the R&D activity in the sector. “Other” recipients had

had a relatively stable share of funding until 1994 with an increase following thereafter. The increase was due to changed disclosure of data in the annual reports, as the funding has been presented for all recipients (and not just for the “research organisations”) since 1995. Funding of other recipients has been falling since 2000, which is due to the transfer of “technology” (funding of training of young researchers from businesses and funding to promote technological and other development, comprising: grants for technological development in businesses, grants

to technological parks, grants for the operation of infrastructure development centres, grants for the development of patented prototypes and grants for EUREKA projects) from the Ministry of Science and Technology to the Ministry of the Economy.

The figure above presents R&D funding by fields of science from 1981 onwards. Funding of the following areas has been distributed by fields of science: joint programme of the RCS, GRP, scientific research (basic and applicative) projects, postdoctoral

Figure 5: Funding of research and development by fields of science

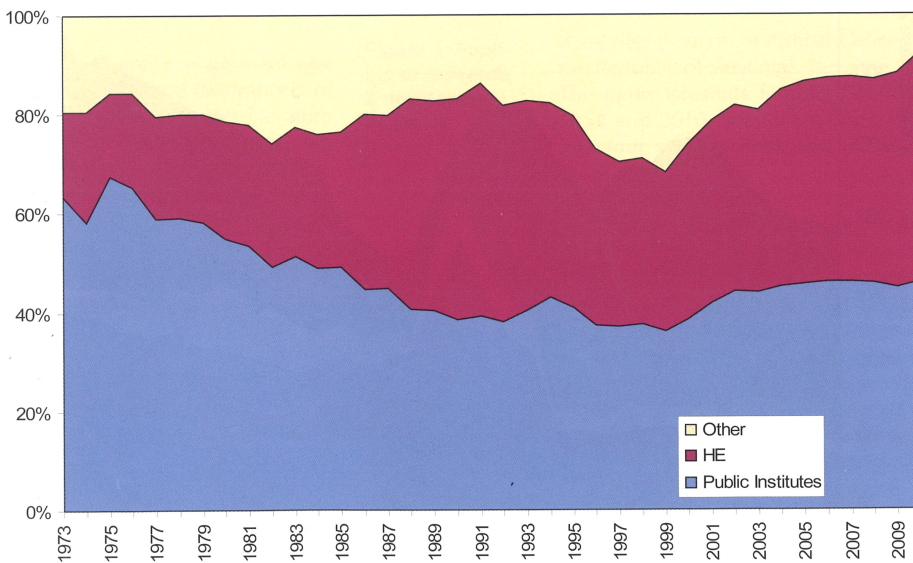
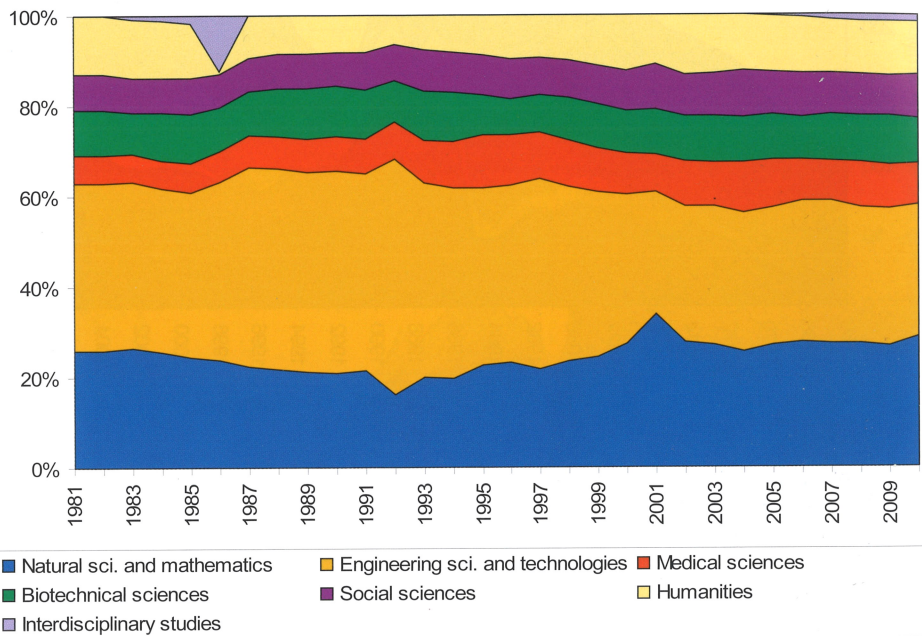


Figure 4: The share of funding of research and development by sectors of performance of the fund recipients

research, R&D projects, technological development, young researchers, postgraduate studies, scholarships, target research programmes, scientific and expert meetings and publications, research equipment and founder’s obligations.

The figure shows that the share of funding of technical sciences had been falling until 2001 when “technology” was transferred away from the Ministry of Science and Technology. Natural sciences and mathematics had been gaining until 2001. The absolute amount for natural sciences and mathematics exceeded that for technical sciences for the first time in 2001 and such (comparative) situation has remained the same to the day. The stable relation stems from the policy of stable funding.

Conclusion

Funding of research in Slovenia has more or less followed the changes in the DP and the GDP since 1954. The latter were strongly influenced by the global economic situation. In addition to economic growth and recessions,

was distinctly falling in the first years of Slovenian independence. R&D funding has been growing slower than the GDP since 1996.

The paper presents only the funds of the ministry responsible for science after 1991 and only the funds of the Agency after 2004. To obtain a com-

our estimate, based on partial collected data, R&D funding of other recipients of funds from the national budget nearly matches the funds of the Agency. Consequently, the budget funds for R&D came very close to 1 % of GDP in 2010.

In conclusion, we present the budget funding of the Agency by sectors of performance and by instrument of funding. The Agency gives more than a half of its funds to public research and other institutions followed by higher education with 42 %. Businesses and private non-profit organisations jointly receive merely 4 % of funds.

By instrument of funding, the Agency earmarks more than a half of funds to research programmes and research projects. They are followed by infrastructure with 24 % and training of young researchers with 18 %.

Figure 6: Share of budget funding from the Agency by sectors of performance in 2010

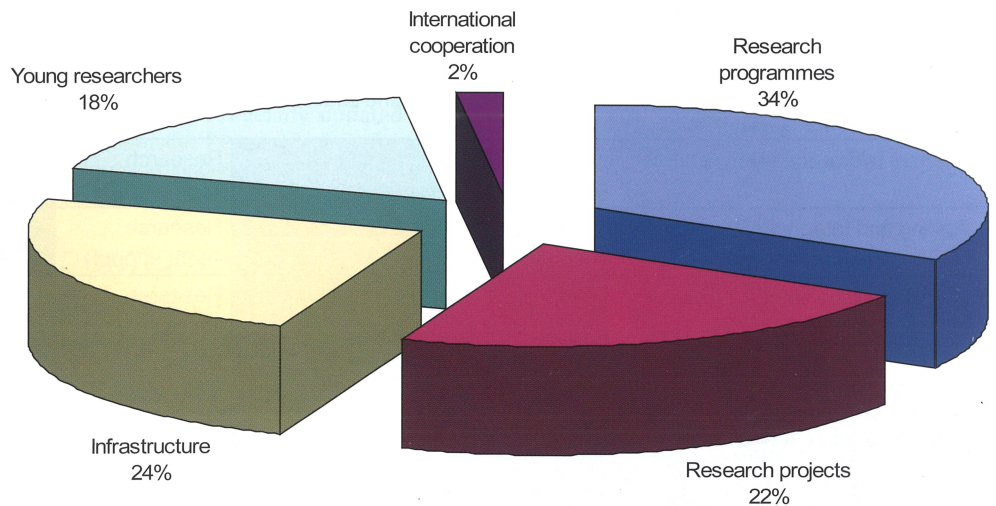
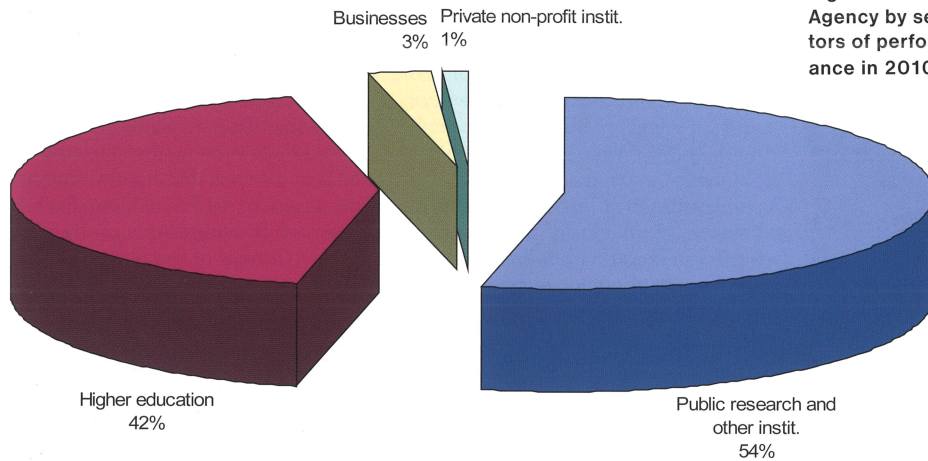


Figure 7: Share of budget funding from the Agency by instrument of funding in 2010

Acknowledgment: I would like to thank to Dr Aleš Gabrič for his expert opinion and proposed improvements.

R&D funding in Slovenia was affected by changes in the socioeconomic and political system, at the national level and at the level of the research activity. R&D funding came the closest to 1 % of GDP in 1990, just before the disintegration of Yugoslavia. The share of R&D funding compared to the GDP

prehensive picture on changes in R&D funding, these data should be supplemented with the entire funds from the government budget spent on R&D. Unfortunately, we have not managed to obtain that information.

The Agency's funds amounted to roughly 0.5 % of GDP in 2010. In

