

LATVIA RESEARCH FUNDING AND QUALITY OF RESEARCH ACTIVITIES

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Abstract. The economic crisis has had a significant impact on funding in research and development (R&D). The main aspect of R&D reform is a clear balance between research funding and quality of research activities. The paper presents the analysis how the structure of the Latvia R&D funding system promotes the quality of research activities in research institutions

The author concluded that the financing system of Latvia R&D with the basic financing grants and the external grants has a number of strengths and weaknesses. Regarding the research quality, the proportions of the basic research grant amount distributed for the maintenance, remuneration and development tasks of a research institution differ. In general, the lower is the value of the total research quality criteria, the bigger is the proportion allocated for the scientific staff remuneration of the total amount of the basic research grant. The competitiveness grants of the research financing represent 92% of the total research amount, and so huge proportion of the competitiveness fund significantly limits the possibilities of research institutions for a long-term planning. The existing funding system causes structural imbalance, and the Latvia R&D funding system is mainly characterized by a performance based system.

Key words: scientific quality, research funding system, basic research grant.

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Introduction

The economic crisis has had a significant impact on funding levels in research and development (R&D), and now, the main aspect of the R&D reform is a clear balance between research funding and quality of research activities. The EU Communication on "Regional Policy contributing to smart growth in Europe 2020", published in 2011, sets out the role for Regional Policy in contributing to the implementation of the Europe 2020 strategy. Therefore, the necessary Latvia competitiveness, reorientation from labour-consuming to knowledge-based economics as well as necessity to fulfil the targets of the strategy EU 2020 concerning higher education and research (investment in research 3% from GDP, young inhabitants with higher education predomination 40%, etc.) will be provided. According to the European Union's strategy "Europe 2020" for smart, sustainable and inclusive growth, the Commission called on member states to focus funding on relevant outputs rather than inputs, using clearly defined targets and indicators together with international benchmarking. Public funding of research institutions, including higher education institutions, is one of the main sources of income for the state research institutions in all the EU member states (Figure 1).

Research institutions must be granted public funds in such a way that promotes effectiveness and efficiency. In general, most countries use a mixture of different research funding mechanisms. In this sense, the funding tools that have been experimented in some countries are as follows:

- formula based funding,
- performance funding;
- competitiveness and targeted funds.

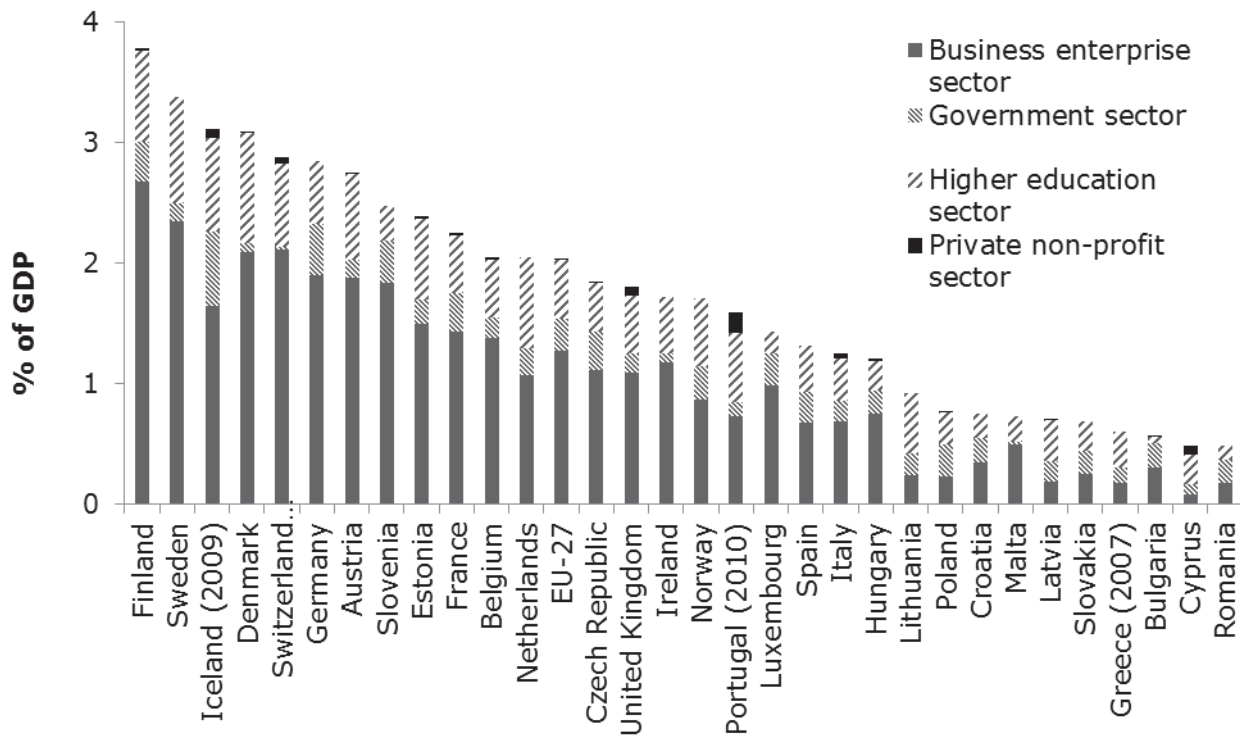
Input-based mechanisms, which can be a part of a formula and focus on inputs to research institutions, such as the number of research personnel, are one of the approaches used in the R&D system. Performance-based mechanisms may be based on outputs, such as the number of publications, or inputs, such as and the number of PhD students/staff with certain characteristics (young researchers). Usually the main funding mechanism is accompanied by a funding formula, or the formulas are used to determine the block grant allocated to research institutions (Modernisation of Higher Education in Europe, 2011).

There are strengths and weaknesses of input-based and output-based funding types. The basic research grants secure the research institutions a long-term planning and steering of activities, and the basic grants enable institutions to initiate research with strong emphasis on the "frontier research". The main problem is to show the basic research grants' efficiency and relevance according to the inputs and outputs of research institutions. Competitiveness and targeted funds raise efficiency and quality, but research funding is complicated due to bureaucracy and unwieldy management (Rates of return and funding models in Europe, 2007).

Research hypothesis – to assure the research quality, the structural balance of the research funding system is necessary.

The objective of the paper is to analyse how the structure of Latvia R&D funding system promotes the quality of research activities in research institutions. The following discussion focuses on the Latvia R&D funding mechanisms, through which more than 24% of the overall public funding is distributed.

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Source: author's construction based on EUROSTAT data

Fig. 1. R&D expenditure by sector of performance in the EU and other countries in 2011 (% of GDP)

In order to achieve the aim, the following tasks were set to:

- to analyse the structure of Latvia research funding system;
- to analyse the basic research grant for the state research institutions;
- to analyse different proportions of the basic research grant distributed for the maintenance, remuneration and development tasks depending on the research quality of a research institution.

The structure of research funding system in Latvia

In 2011, approximately 76% of the total research funding was constituted by external funding (foreign and enterprise financing), and only 24% of the total research funding consisted of the state financing. The level of the external grants varies among different research areas of technical and natural sciences, human and social sciences. In 2011, approximately 25% of the total research funding came from private funds, firms and organizations (Figure 2).

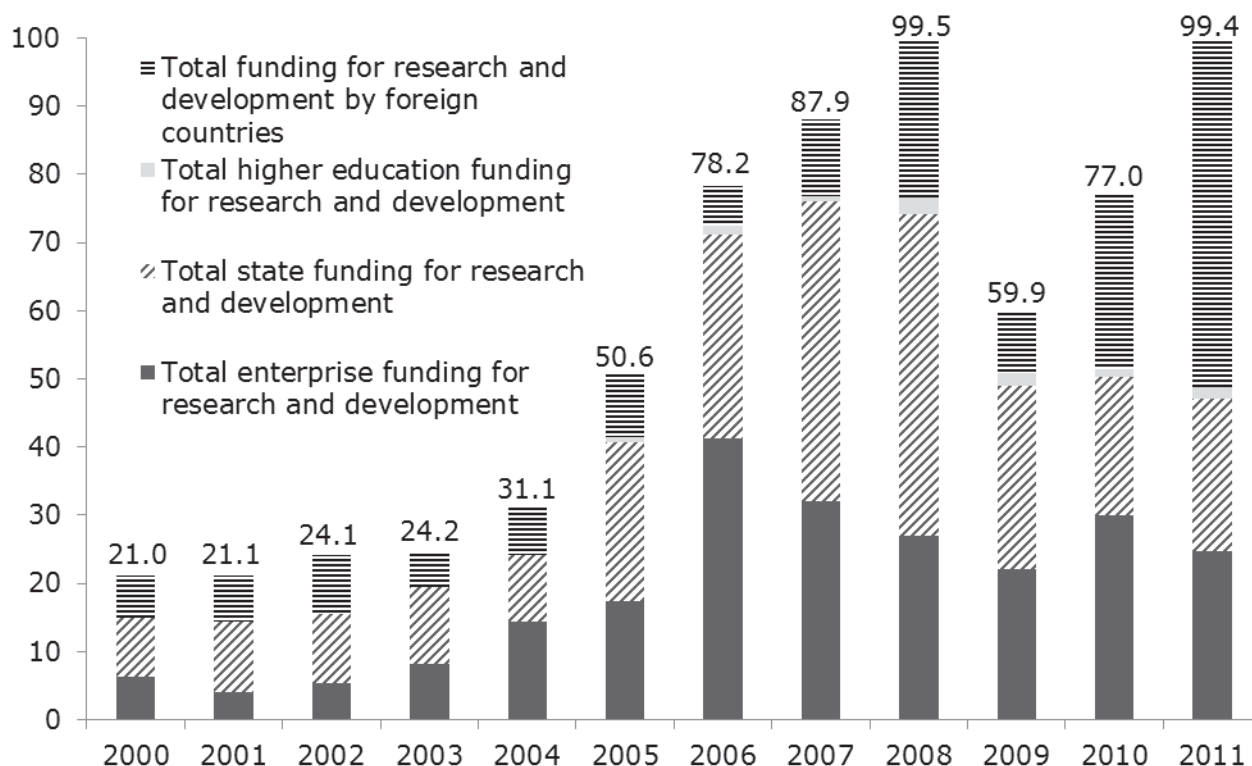
Latvia has a two-tier system for resource allocation to research. The first tier is the basic grants from the Financial Act allocated by the Ministry of Education and Science (MoES) to the research institutions. The second tier comprises resource allocation from the Latvian Council of Science, state research programmes, foundations, R&D funds from individual ministries, the EU, and private funds.

The total amount of the basic grants represents 36% of the total state financing, but at the same time

it constituted only 8% of the total research financing in 2011. The basic funds allocated through objective formulae are regarded as a capital to a research institution for a long-term planning, for its adaptation to changes in the demand, and for the outcome and quality of the basic research.

The basic grants enable the institutions to maintain buildings, infrastructure etc. through periods of falling revenues from other sources. The size of this grant depends on a formula. The second tier of the research financing consists of:

- competitiveness research grants, provided by the Latvian Council of Science, up to 4% of the total research amount;
- state research programmes, provided by the Ministry of Education and Science, are state commissions for the performance of scientific research in a specific economic, educational, cultural or other sector, which is the state priority, with the purpose to promote the development of the particular sector, up to 4% of the total research amount;
- R&D funds from individual ministries, up to 8% of the total research amount;
- research carried out to fulfil demands of the industry, the government and other public sector organizations, up to 25% of the total research amount;
- market-oriented research, provided by allocating the state budget resources to the practically applicable projects, the purpose of which is to promote the integration of science and manufacturing, the development of technology-oriented fields and the



Source: author's construction based on Central Statistical Bureau of Latvia data

Fig. 2. R&D expenditure (mil LVL) by sector of performance in Latvia

creation of new jobs using the EU Structural Funds as well participation in the EU research programmes (e.g. FP7), up to 51% of the total research amount.

The second tier of the research financing represents 92% of the total research amount, as opposed to first tier of research financing or basic grants, which represents only 8% of the total research amount. Contrary to most of the other grants and sources of income of the research institutions, the basic grants are allocated to research as a predominantly non-specific activity related funds. The distribution of the grants among the research institutions depends on inputs/outputs and is based on historical aspects.

Basic research grant for the state research institutions in Latvia

The amount provided by the basic research grant for the state research institutions, the state institutions of higher education and the research institutes of the state institutions of higher education that are registered in the Register of Research Institutions is allocated in accordance with the procedures specified by the Cabinet of Ministers of the Republic of Latvia. The basic research grant is allocated as a lump sum to the state research institutions. The basic grants are not earmarked for specific research purposes. According to the Law on Scientific Activity, the basic research grant of the state scientific institutions shall be composed of resources for:

- the maintenance of research institutions (maintenance of buildings and equipment, payment of public utility services, work remuneration of administrative, technical and maintenance staff);
- remuneration of the scientific staff involved in the performance of the scientific research specified by the founder;
- development of the research institutions registered in the Register of Research Institutions, according to these institutions' operating strategy for achievement of objectives. The responsible ministry must approve the operating strategy of the research institutions.

These grants are important for supporting the basic research and improvement of its quality. The proportion of the basic grants can be tied to co-financing of external projects (Frolich N., 2006). The basic research grant for scientific institutions is granted on the basis of the scientific performance indicators: type of projects, publications' impact on the development of scientific knowledge, cooperation with businesses and other customers, cooperation in higher education and scientific qualification as well the average number of scientific staff in full-time equivalents (FTE) in research institutions. In Latvia, a mixed formula base funding and performance-based funding model has been introduced for the basic research grant allocation. The basic funding will be distributed to research institutions according to the quality of research (The Cabinet of Ministers of the Republic of Latvia, 2009). The output-oriented, formula-based funding model used

for allocation of funds for research institutions has three main components:

$$BF = (I + P) \times A \quad (1)$$

where

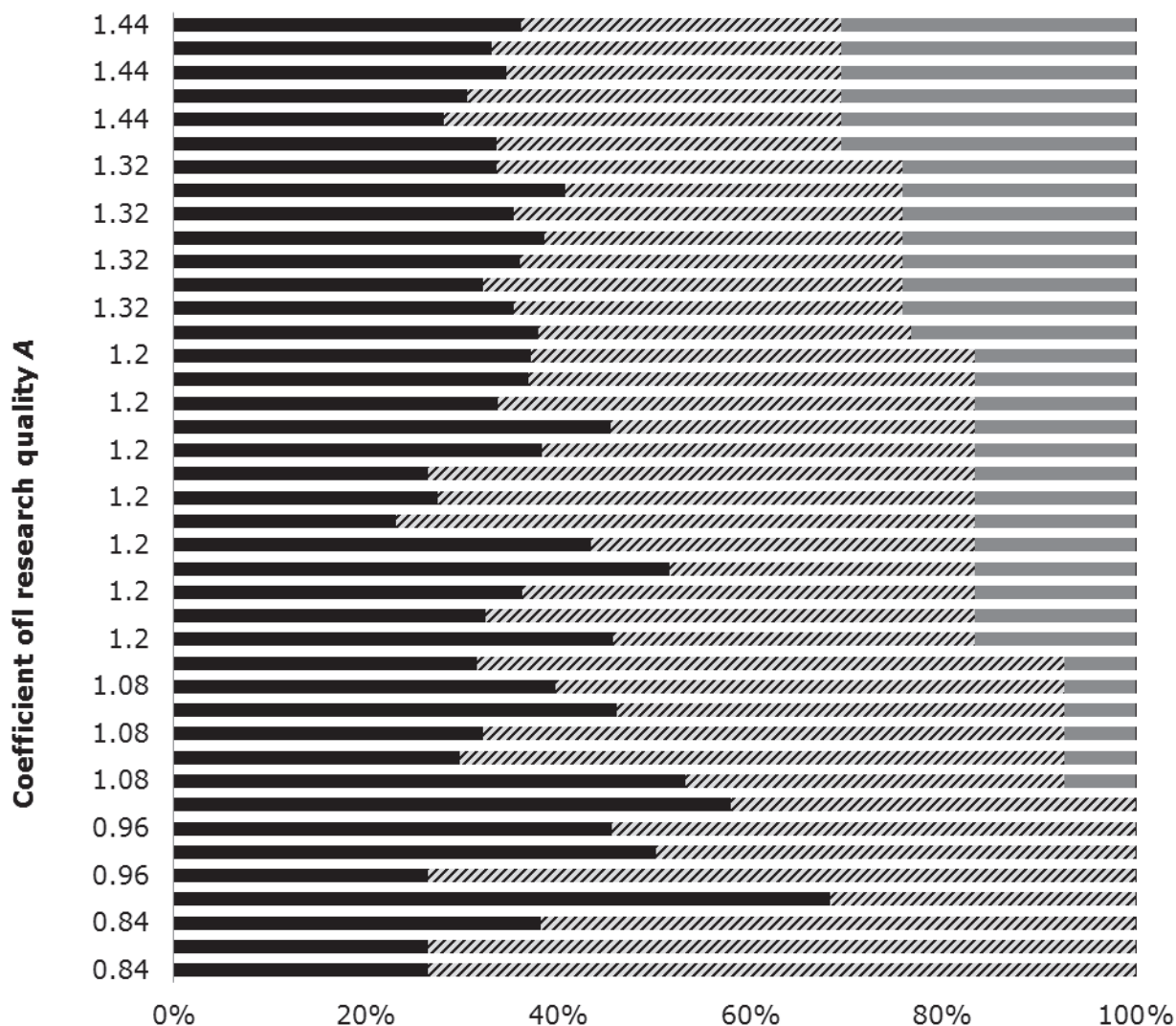
— *I* is the maintenance of scientific institutions and depends on the coefficient *K* of the research field: *K*=2 for natural, engineering, technological,

health, environment, agriculture and forest science, and *K*=1.3 for social and human science;

— *P* is the remuneration of the scientific staff;
 — *A* is the coefficient of research quality of research institutions.

The coefficient of research quality of research institutions:

$$A = E \times 0.12 \quad (2)$$



- The maintenance of research institutions on average in % of the total amount of basic research grant
- ▨ The remuneration of the scientific staff on average in % of the total amount of basic research grant
- Other objectives, according institutions operating strategy, on average in % of the total amount of basic research grant

Source: author's construction based on MoES data

Fig. 3. The distribution of the resources for the maintenance of research institutions, remuneration of the scientific staff and development of research institutions in 2012, depending on the coefficient of research quality

where

E is the total sum of four criteria E_1, E_2, E_3 and E_4 , and:

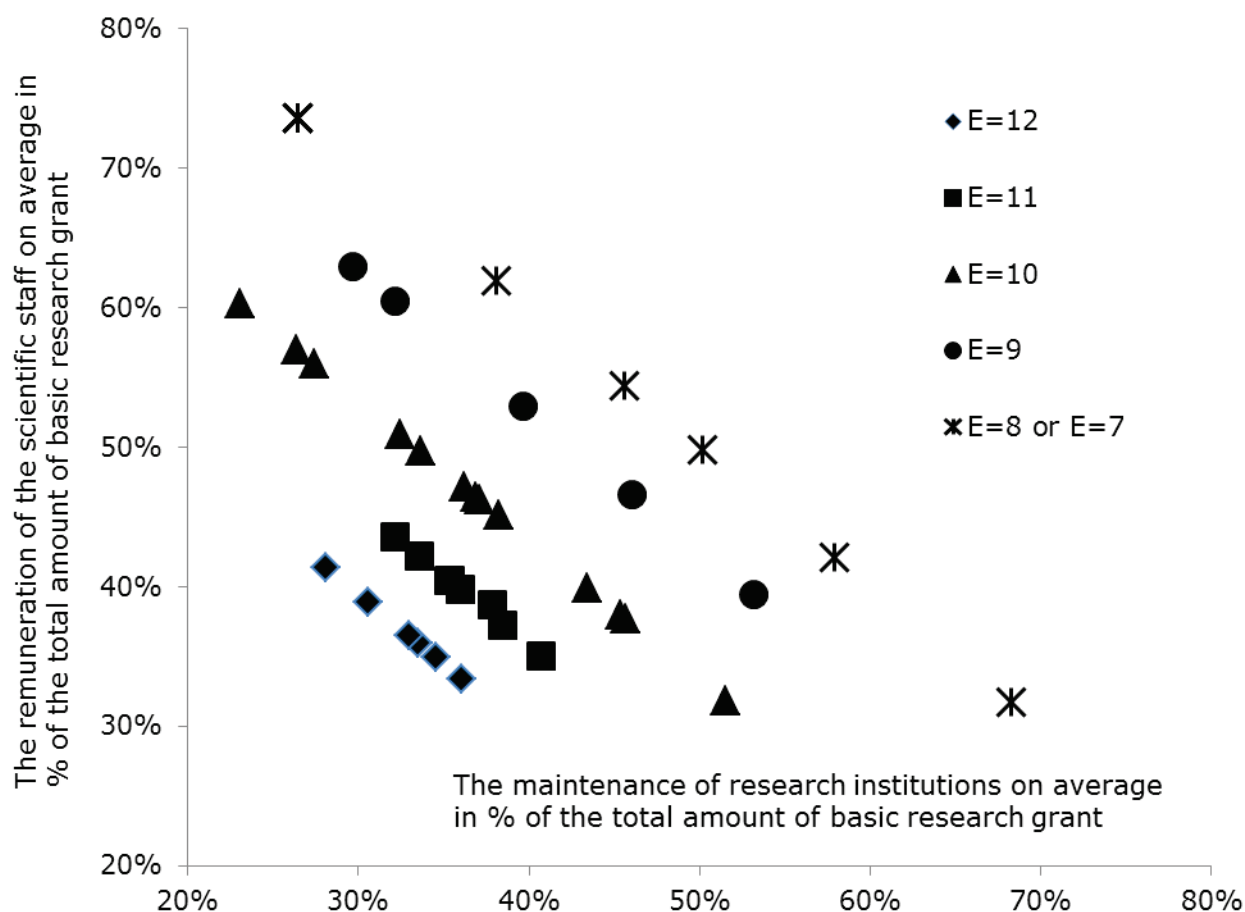
- E_1 is the discrete evaluation of the number of research projects per FTE;
- E_2 is the discrete evaluation of the number of research publications per FTE;
- E_3 is the discrete evaluation of the number of international and Latvian patents and licenses, number of market-oriented research projects per FTE;
- E_4 is the discrete evaluation of the number of master degree and PhD theses per FTE and/or the % of young researchers from the total number of scientific staff (max, if 20% or more of young researchers).

The maximum value of all criteria E_1, E_2, E_3 and E_4 is 3 points, and the minimum value is 0 points. The discrete value of E_i ($i=1,..,4$) criterion depends on the quantity and quality of research activities of research institutions. For example, the second criterion E_2 "discrete evaluation of the number of research publications per FTE" has a maximum value 3, if the last five years a research institution had 0.5 research publications per FTE of research personnel published and indexed by

Web of Knowledge, SCOPUS or A&HCI, SSCI or other leading internationally available research databases, or 0.3 monographs per FTE of research personnel listed in the U.S. Library of Congress catalogues. At the same time, E_2 criterion has a minimum value 0, if a research institution had no research publications during the evaluated period.

The total sum of the four criteria E can vary from 0 to 12, and respectively the coefficient of research quality of research institutions A from 0 to 1.44. Using the formula to calculate the maintenance of scientific institutions I and remuneration of the scientific staff P , the total amount of the basic grant BF using formula (1) was evaluated each year for research institutions using the previous year data. It is important to note, that the Ministry of Education and Science is planning the basic research grant for each research institution in proportion to the annual state budget for the total basic research grant. In 2012, the basic research grant consisting of 8 mln LVL accounts only for 20% of the estimated total basic research grant, based on the research institution's quantitative and qualitative data for the year 2010.

The basic funds allocated by the objective formulae enable the institutions to maintain buildings,



Source: author's construction based on MoES data

Fig. 4. The relationship between the maintenance of research institutions and remuneration of the scientific staff in 2012 depending on research quality of the research institutions

infrastructure, and remuneration and fulfil other objectives, according to institutions' operating strategy. The Figure 3 shows the distribution of the resources for the maintenance of research institutions, remuneration of the scientific staff and development of research institutions in 2012, depending on the coefficient of research quality. The research institutions with the coefficient of research quality A more than 1 have a possibility to arrange financing not only for the maintenance and remuneration but also for the development of the research institution. If the coefficient of research quality A is less than 1, the research institutions are not sustainable and have spent the basic research grant mainly for the remuneration of the research personnel.

Research results and discussion

Regarding the research quality coefficient, different proportions of the amount of the basic research grant are distributed for the maintenance, remuneration and fulfilment of development tasks of a research institution. For example, in 2012, one-third of the fund was distributed for the higher quality research institutions with research quality coefficient $A=1.44$ or $E=12$ to facilitate the development tasks of the research institutions. Whereas, the distribution for the institutions with the research quality coefficient $A=1.32$ or $E=11$ was up to 24%, for the research quality coefficient $A=1.2$ or $E=10$ – up to 16%, but for the research quality coefficient $A=1.08$ or $E=9$ – up to 7% of the basic research grant. The research institutions with the research quality coefficient $A=0.96$ or $A=0.84$ are not granted funds for the research institution's development and are not sustainable.

The analysis of the distribution between the funds for the maintenance of research institutions and remuneration of the scientific staff shows that there is a big difference between the research institutions. It can be explained by the research field, the number of research personnel and scientific staff as well as by the maintenance of research buildings. The relationship between the maintenance of research institutions and

remuneration of the scientific staff in 2012 depending on the quality criteria of the research institution E is shown in the Figure 4.

It is concluded that those research institutions that have $E=12$, on average are allocated 33% of the basic research grant for the maintenance of research institutions and 37% for the remuneration of the scientific staff. Whereas, the research institutions with the research quality $E=8$ or $E=7$ receive on average 42% of the basic research grant for the maintenance of research institutions and 58% for the remuneration of the scientific staff. In general, the lower is the total research quality criteria E value, the bigger is the proportion of the remuneration of the scientific staff P within the total amount of the basic research grant. The Table 1 gives information about the relative distribution within the basic research grant among the maintenance of research institution, the remuneration of the scientific staff and other objectives, according to institution's operating strategy in 2012.

In Latvia research institutions, the increasing compliance obligations (due to the EU Structural Funds projects, the Latvian Council of Science grants, and the European framework projects) significantly reduce the research institutions' room to manoeuvre and to set their own research agendas. It is estimated that 92% of research institutions' research income now comes from the EU Structural Funds, the Latvian Council of Science or other contract funding. As the result, research subsidies cover only 8% of the total costs. Due to the EU Structural Funds projects, one of the biggest changes in Latvia R&D funding is the significant increase in contract funding. The contract research in research institutions covers about 92% of all the research. The contract research includes all the research activities that funded by third parties, but not by the Ministry of Education and Science and the Latvian Council of Science. The competitive funding raises quality, however these grants target often areas that are too narrow and do not promote frontier research (Schmidt E.K., Langberg K., Aagaard K., 2006).

Table 1
Relative distribution of the basic research grant among the maintenance of research institution, the remuneration of the scientific staff and other objectives, according to institution operating strategy in 2012

Total research quality criteria E	Number of the research institutions	The maintenance of research institutions I	The remuneration of the scientific staff P	Other objectives, according institutions operating strategy
		on average in % of the total amount of basic research grant		
12	6	33 %	37 %	30%
11	8	36 %	40 %	24%
10	13	37 %	47 %	16%
9	6	39 %	54 %	7%
8 or 7	8	42 %	58 %	0

Source: author's calculations based on MoES data

Now, the Ministry of Education and Science is discussing a new funding model for R&D in Latvia in response to concerns about the R&D cost effectiveness. The promoters of the reform considered the previous funding system as the cause of structural imbalance, because a part of the research institutions with low research quality does not have a real funding for the development. The financing system will influence the research strategies of the research institutions. The Latvia R&D funding system is mainly characterized by a performance based system.

Conclusions

1. The financing system of Latvia R&D with the basic financing grants and external grants has a number of strengths and weaknesses. Regarding the basic grants, there is clarity about the importance of this aspect in scope of the financing system, since the basic financing grants provide research institutions security and enable a long-term planning. In addition, the basic grants are significant for research institutions providing a possibility to be flexible and adaptable to changing conditions. Accordingly, the factual amount of the basic financing grants is not on the assumed level as they should be according to the estimated value by the Ministry of Education and Science, and represent only 8% of the total research amount.
2. The research financing by competitiveness grants represents 92% of the total research amount, and so huge proportion of competitiveness fund significantly limits the possibilities of research institutions for a long-term planning. The research institution is forced to pay more attention to projects with available funding rather than to projects where research institution has a high competence and is more competitive. The research institutions with a high coefficient of research quality have a possibility to arrange financing not only for the maintenance and remuneration, but also for the development of research institution. Otherwise, the research institutions are not sustainable and spend the research grants mainly for the remuneration of the research personnel.
3. Depending on the research quality coefficient, different proportions of the amount of the basic research grant are distributed for the maintenance, remuneration and development tasks of a research institution.
4. The analysis of the fund distribution between the maintenance of research institutions and remuneration of the scientific staff shows that there is a big difference between research institutions. It is explained by the research field, the number of research personnel and scientific staff as well by the maintenance of research buildings. In general,

the lower is the value of the total research quality criteria, the bigger is the share of the remuneration of the scientific staff within the total amount of the basic research grant.

5. Now, the existing funding system is considered as the cause of structural imbalance, because a part of the research institutions with low research quality does not have real funds for the development. The Latvia R&D funding system is mainly characterized by a performance based system.

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