

## INVESTMENTS IN AGRICULTURE RESEARCH IN LATVIA

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**Abstract.** *This research provides a review of recent trends on investment in agricultural research in Latvia including a description of the funding system for agriculture research, an assessment of the availability of data and an analysis of recent investment trends. The research results reflected in this paper were used to prepare a Review for Latvia – a study on investment in agricultural research for the project IMPRESA under the 7th Framework Programme. When analysing the data availability one may conclude that there is a lack of consistent, comparable and publicly available data on R&D expenditures regarding agriculture. Total R&D expenditure for Agricultural sciences in Latvia has increased from € 3 million in 2000 to € 13 million in 2011. In 2011 the share of agricultural expenditure in total GERD expenditure was 9%. The EU funding programs have facilitated the increase of R&D expenditure, involving not only government and higher education institutions but business enterprises as well. Comparing to the data for scientific institutions of all sectors, scientific institutions working in agriculture are less involved in the framework programmes and international projects and also receiving less income in the tenders from the state budget, but comparatively more funds are received from contracts with private sector.*

**Key words:** *agricultural research expenditures, public and private investments.*

### INTRODUCTION

From 2011 to 2013 the growth of Latvian economy on average amounted to 4.7% annually, which puts Latvia among the fastest growing economies in the EU, although the Gross Domestic Product (GDP) per inhabitant in Latvia was 7 100 euro in 2013 [1] – it is 70% of the world's average and 30% of European Union member states' average [2]. In 2014 the economic growth rate slowed down, which was driven by trends in the external environment: slower growth within the EU as previously expected, and the complications of the economic relations with Russia. Still the Ministry of Economics of Latvia expects GDP growth rate in 2015 to reach 2% [3],[4]. The share of agricultural, hunting and forestry in the gross value added was 3.6% in 2013, the share of agri-food sector – 2.5% in 2012. The total gross value added in current prices by both agriculture and agri-food sectors increased since 2011 [5]. In 2012 there were 92.1 thousand agricultural holdings in Latvia; in 2013 the number of agricultural holdings decreased to 81.8 thousand. These are mainly small farms, on average the total land area per holding is 29.1 ha [5],[6]. Share of labor force in agriculture, forestry and fishing was 8.4% of total employed in national economy in 2013, but a 0.3% decrease in employment in 2015-2016 for this sector is forecasted. The industry's export growth has positively affected Latvia's agricultural and food product foreign trade balance, which still remains negative [7]. The Europe 2020 strategy sets a 3% of the GDP objective for R&D intensity [8] and in the Law of Scientific Activity of Latvia an annual increase of 0.15% from the GDP is set till the state funding for R&D reaches 1% from the GDP [9]. Despite, the fact that the funding of research in Latvia has increased significantly – from 18 million euro in 1995 to 147 million euro in 2012; the R&D expenditure as share of GDP in Latvia is still very low – 0.66% in 2012[1].

This research aims to evaluate recent trends on investment in agricultural research in Latvia, including description of the national agriculture research system, an assessment on the availability of data and an analysis of recent investment trends. Agricultural research covers all research on the promotion of agriculture, forestry, fisheries and foodstuff production. It includes: research on chemical fertilisers, biocides, biological pest control and the mechanisation of agriculture; research on the impact of agricultural and forestry activities on the environment and research in the field of developing food productivity and technology.

### MATERIALS AND METHODS

This research is performed using monographic, analysis and synthesis also statistical analysis methods and the data collected by Central Statistical bureau of Latvia and Eurostat. The authors carried out interviews

and consultations with the leading representatives of 3 institutions working in agriculture research and with the representative from the Ministry of Agriculture during January to February, 2015. The research results reflected in this paper were used to prepare a Review for Latvia – a study on investment in agricultural research for the project IMPRESA: The Impact of Research on EU Agriculture (a project under the 7th Framework Programme).

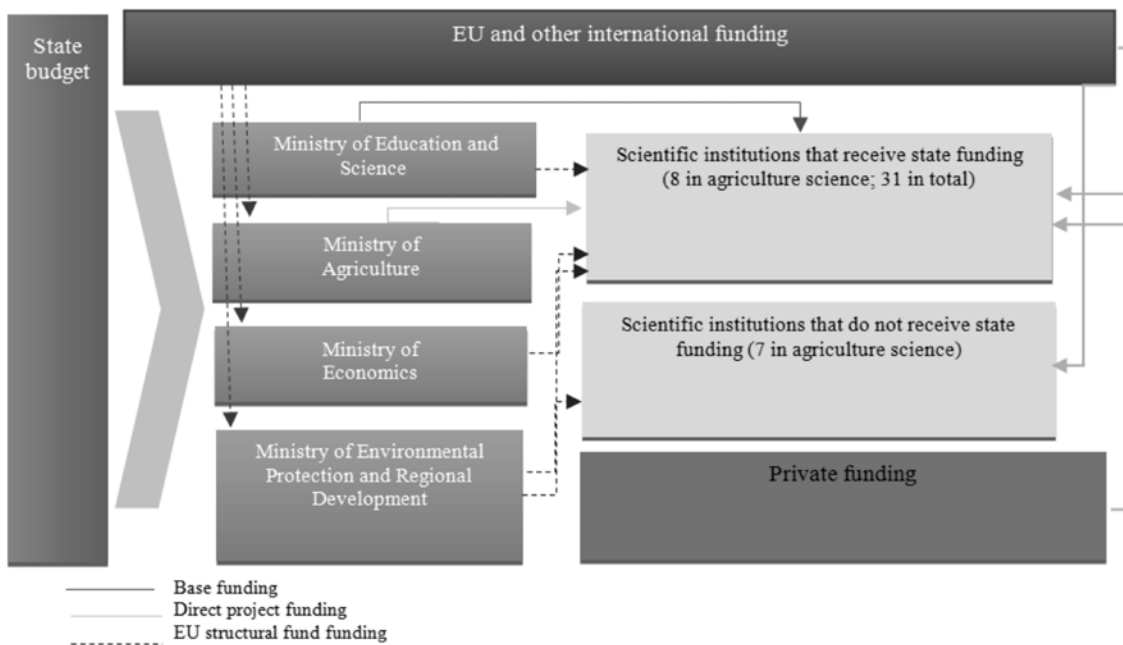
**Data Availability on Agricultural Research Expenditures**

Although the information on total R&D expenditure is available since 1993, detailed data regarding sectors are available since 1995, the data in agriculture both in public and private sector are fragmented and in many cases – unavailable. Total R&D expenditure for the classification by fields of science (FOS) for Agricultural sciences in Latvia is available from 2000 till 2011. There are no available data on R&D expenditure in private non-profit sector. The data on public sector expenditure for agriculture science are available for previous eight years, starting from 2006, what limits analysis of long-term tendencies and forecasting. The Business Enterprise R&D expenditure for the agricultural sector and the food processing sector showed trend breaks due to a change in the data collection methodology – therefore complete information according to the latest methodology is available only for 2010. When analysing the data availability one may conclude that there is a lack of consistent, comparable and publicly available data on R&D expenditures regarding agriculture.

**RESULTS AND DISCUSSION**

**Overview of Latvian agricultural education and science system**

Research and education in Latvia are provided both by public and private institutions. Secondary agricultural education is provided in 10 agricultural secondary schools and colleges [11]. But the higher education in BSc, MSc and PhD levels in agriculture, forestry and veterinary medicine can be obtained in the Latvia University of Agriculture. There are also two groups of research institutions – state and private institutions. In 2015 there are a total of 91 scientific institutions, from those 15 scientific institutions work with various topics of agriculture research, 8 of them are state funded and receive core public funding [12].



Source: made by the authors

Figure 1. Distribution of funding in the agriculture science in Latvia

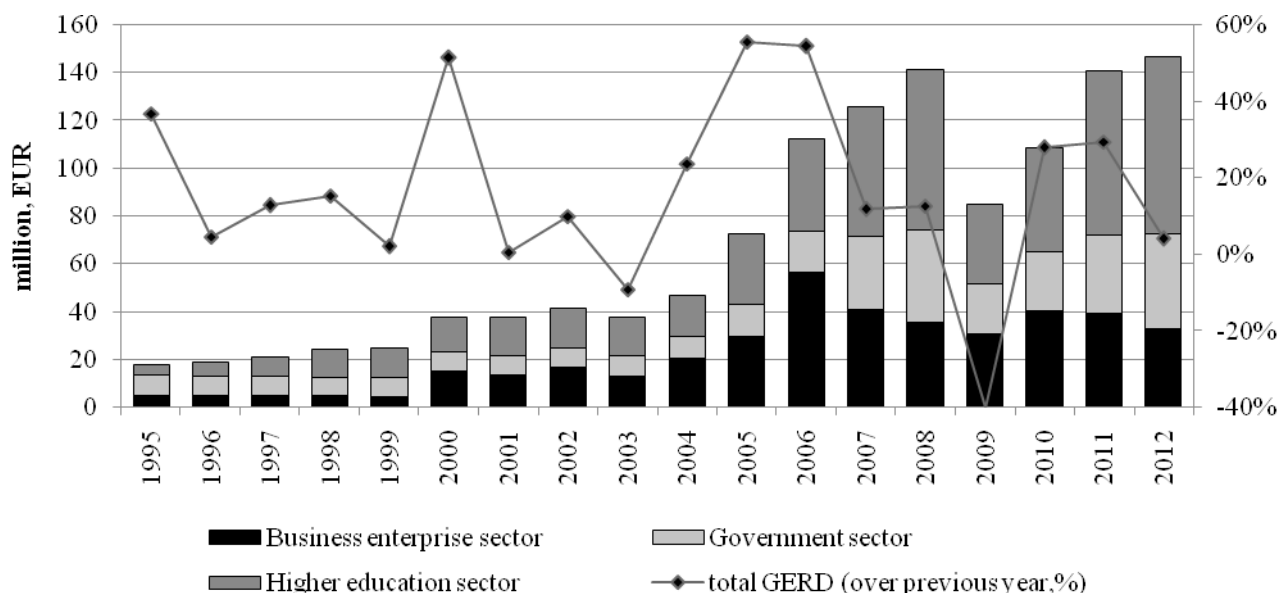
Research and education is highly dependent on the public sector, because it is funded by the state budget and the funding is allocated by the sectorial ministries. The overall research policy planning, evaluation and distribution of the core funding is done by the Latvia Ministry of Education and Science, but the research priorities in agriculture are set by the Latvia Ministry of Agriculture in accordance to the relevant topicalities of the sector in the EU.

There are three main funding sources for the scientific institutions (see Fig. 1) – 31 institutes receive core funding from the State budget. Apart from core funding, all scientific institutes can compete for the national grants and projects, including under the State Research Programme.

**Recent trends regarding investment in agricultural research**

The available data shows that the Gross domestic expenditure on Research and Development expenditure (GERD) in Latvia has increased significantly in 18 year period – from € 18 million in 1995 to € 147 million in 2012 (see Fig. 2). Despite such increase, the R&D expenditure as share of Gross Domestic Product (GDP) in Latvia is very low (0.66% in 2012) comparing with average share of R&D expenditures in the EU counties – 2.07% in 2012. The highest share was observed in 2006 – 0.7% of GDP, but then it dropped till 0.49% in 2009 as a result of economic recession.

When analysing the GERD tendencies over a time period, the clear impact of economic recession can be observed. Before accession to the EU in 2004, the increase of R&D expenditure over previous year was ~ 10%, excluding year 2000 when per-accession programs were opened. After 2004 till 2008 the annual increase was substantial – reaching 56% in 2005; followed by decrease in 2009 by 40%. The largest share of this expenditure mainly comes from the higher education sector (50% of the total GERD expenditure in 2012), since higher education establishments are most familiar with structural funding for science.



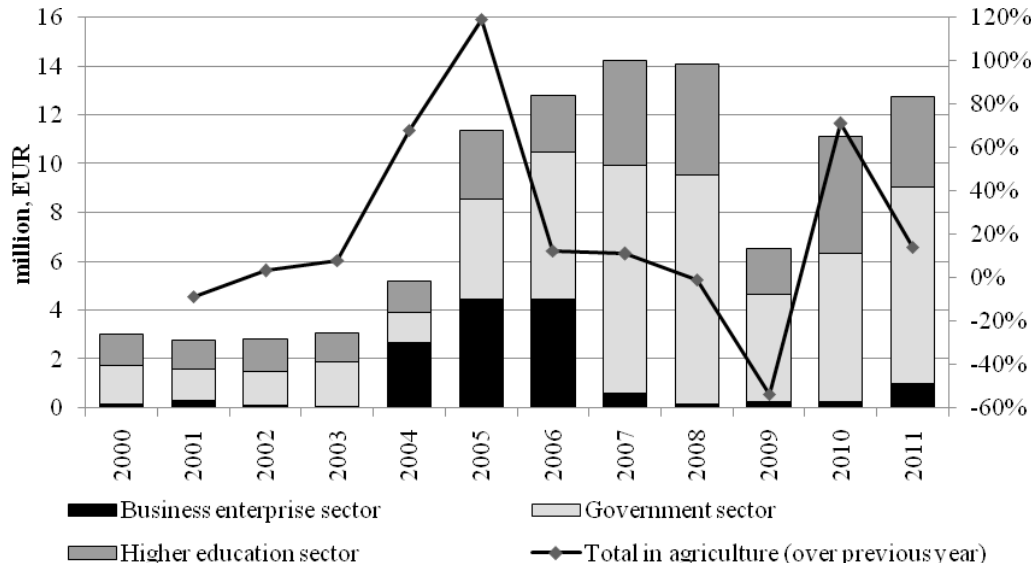
Source: [2]

Figure 2. GERD for business enterprise, government and higher education sectors, 1995-2012

Total R&D expenditure for the classification by FOS for Agricultural sciences in Latvia has varied due to macro-economic issues – the accession to the EU and economic recession, but overall it has increased from €3 million in 2000 to €13 million in 2011. It can be concluded that expenditures for agriculture have been changed more intense in both increase and decrease of total R&D expenditure in analysed time period, showing a dependence on the overall situation.

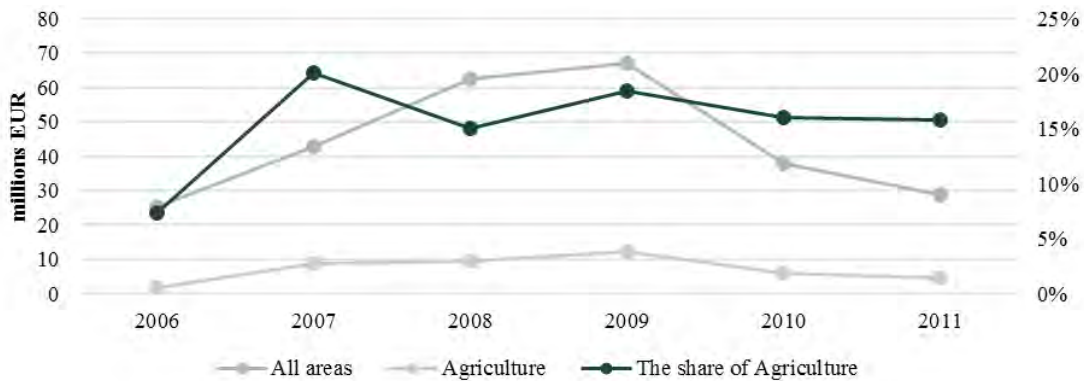
The total R&D expenditure for agriculture in business enterprise, government and higher education sectors are presented in Figure 3, reflecting that EU funding programs have facilitated the increase of R&D expenditure starting from 2004, involving not only government and higher education institutions but business enterprises as well.

The total Government Budget Appropriations or Outlays for R&D (GBAORD) has increased from €14 million in 2000 till €67 million in its highest point in 2009. In 2011 the GBAORD were €29 million, decreasing by 43% comparing with 2009. The share of agriculture (Fig. 4) in the GBAORD is 16% in 2011 (€4.5 million); and it has not been substantial changing in thee analysed time period. The total GBAORD for agriculture shows the same tendencies as total GBAORD – the increase from 2006 till 2009 was significant (more than six times), but since then the decrease is observed.



Source: [2]

Figure 3. R&D for agriculture in business enterprise, government and higher education sectors, 1995-2012



Source: [2]

Figure 4. Government Budget Appropriations or Outlays for R&D in Agriculture, 2006-2011

**Overall trends in agricultural research in Latvia**

The consultations with the research institutions and the representatives of the Ministry of Agriculture indicated that there is a mutual understanding on the common research topics by the research institutions and the Ministry of Agriculture. When funding scientific projects Ministry of Agriculture is mainly focusing on the topics on which the national results are requested at the EU level within the Common Agriculture Policy or for the National Development Plan at the national level.

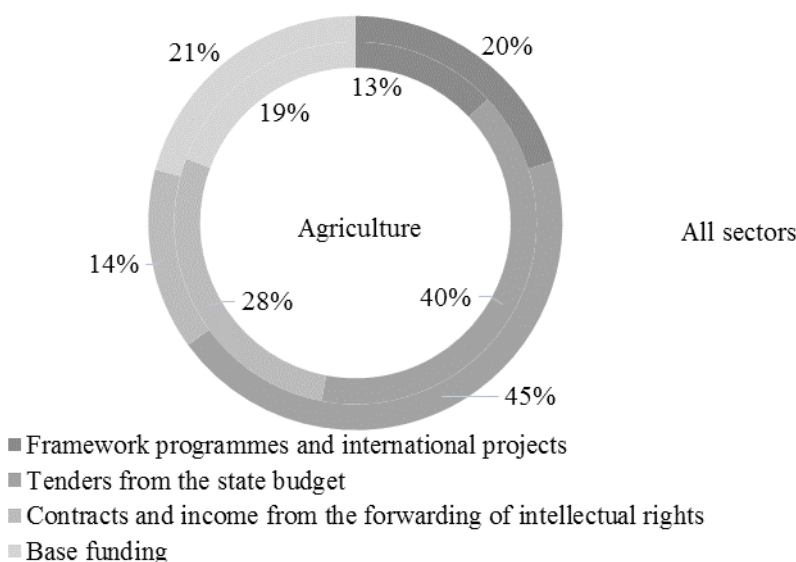
Agriculture research is also supported by the State research programme – in 2013 the Latvian government adopted six priority areas in science for the period of 2014-2017; two of these priorities included agricultural sciences and forestry. Thus the share of agricultural and forestry research in the State research programme funding for 2014-2017 is 19% of the financing for all state research programmes which makes a total of 26 million euro [14].

The topics of national research are very much in line with the research priorities of the EU. Still there is no common research strategy and the involvement of private sector in the setting of national research priorities for agriculture research is lacking. In the consultations several directions and research topics were highlighted as relevant although not all of them highly represented by research projects and funded. Among these research directions were: efficient use of natural resources; sustainable intensification; climate change adaptation and mitigation; plant breeding and protection technologies and other topics linked with organic farming,

sustainability of farming, biological diversity, precise agriculture, processing and storage technologies of agriculture production etc.

A current research topic in the EU and also in Latvia is knowledge based bio-economy. The Latvian strategy for developing knowledge-based bio-economy is not elaborated yet, but 14 institutions, including the Ministry of Agriculture, Latvia University of Agriculture and several research institutes have developed a Strategic Association for Research in Bioeconomy in 2014 that could be a starting point for the further development of the strategic priorities, and consequently studies on this research topic [13].

The analysis of the publicly available annual reports submitted by all state funded scientific institutions for application to the core public funding and the materials of the Ministry of Education and Science in the aspect of distributed funding in 2014 revealed that on average 19% of funds for scientific institutions in agriculture science comes from the core funding, 13% from framework projects and other international projects, but the highest share of funding (40%) comes from the projects funded from the state budget. Contracts and income from the forwarding of the intellectual rights creates 28% of funds (see Fig. 5). Comparing to the data of all sectors, scientific institutions working in agriculture are less involved in the framework programmes and international projects and also receiving less income in the tenders from the state budget, but comparatively more funds are received from contracts with private sector.



Source: [15]

Figure 5. Division of funding by funding sources in scientific institutions in 2014, %

The consultations with the scientific institutions indicated that there is a need for strengthening the cooperation with the practice and the interviewees stated that involvement of practice is stressed in the most project calls for agriculture research. However, interviewees also criticized the national administration of EU Structural Funds because in many cases it is requested to involve enterprises as project partners or beneficiaries, but the bureaucratic procedures during the project implementation are so complicated and time consuming that enterprises and especially farmers are not ready to participate.

It was also stated that responding to financial constraints and government incentives scientific institutions increasingly compete for the EU funds and try to compete also internationally for the funding initiatives available in EU Horizon 2020 Programme, Interreg and other EU research programs and also attraction of private funding. Consequently most of the research is project-based therefore limited in time of the project implementation that is in most cases 2-3 years. The research becomes more fragmented and linked to the funding sources, thus affecting ability to obtain long term data especially typical and needed for agriculture research.

## CONCLUSIONS

The Gross domestic expenditure on Research and Development expenditure in Latvia has increased significantly (more than 8 times) since 1995 and the clear impact of overall economic development can be



observed. The largest share of this expenditure mainly comes from the higher education sector. Total R&D expenditure for the classification by FOS for Agricultural sciences in Latvia has varied due to macro-economic issues – the accession to the EU and economic recession, but overall it has increased, involving not only government and higher education institutions but business enterprises as well.

The highest share of funding (40%) for scientific institutions in agriculture science comes from the projects funded from the state budget. There contracts and income from the forwarding of the intellectual rights creates 28% of funds. In response to the limited local financial resources, scientific institutions are internationalise their activities and are increasingly attempting to obtain international funding.

The main topics for current and future research are efficient use of natural resources; sustainable intensification; climate change adaptation and mitigation; plant breeding and protection technologies, knowledge based bio-economy and other topics linked with organic farming, sustainability of farming, biological diversity, precise agriculture etc., but as most of the research is project-based, it becomes more fragmented and it is problematic to carry out long term-trials.

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